Preface

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SIXTH FRAMEWORK PROGRAMME

PLUREL

PERI-URBANISATION IN EUROPE

Towards European Policies to Sustain Urban-Rural Futures

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Annette Piorr
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SYNTHESIS REPORT

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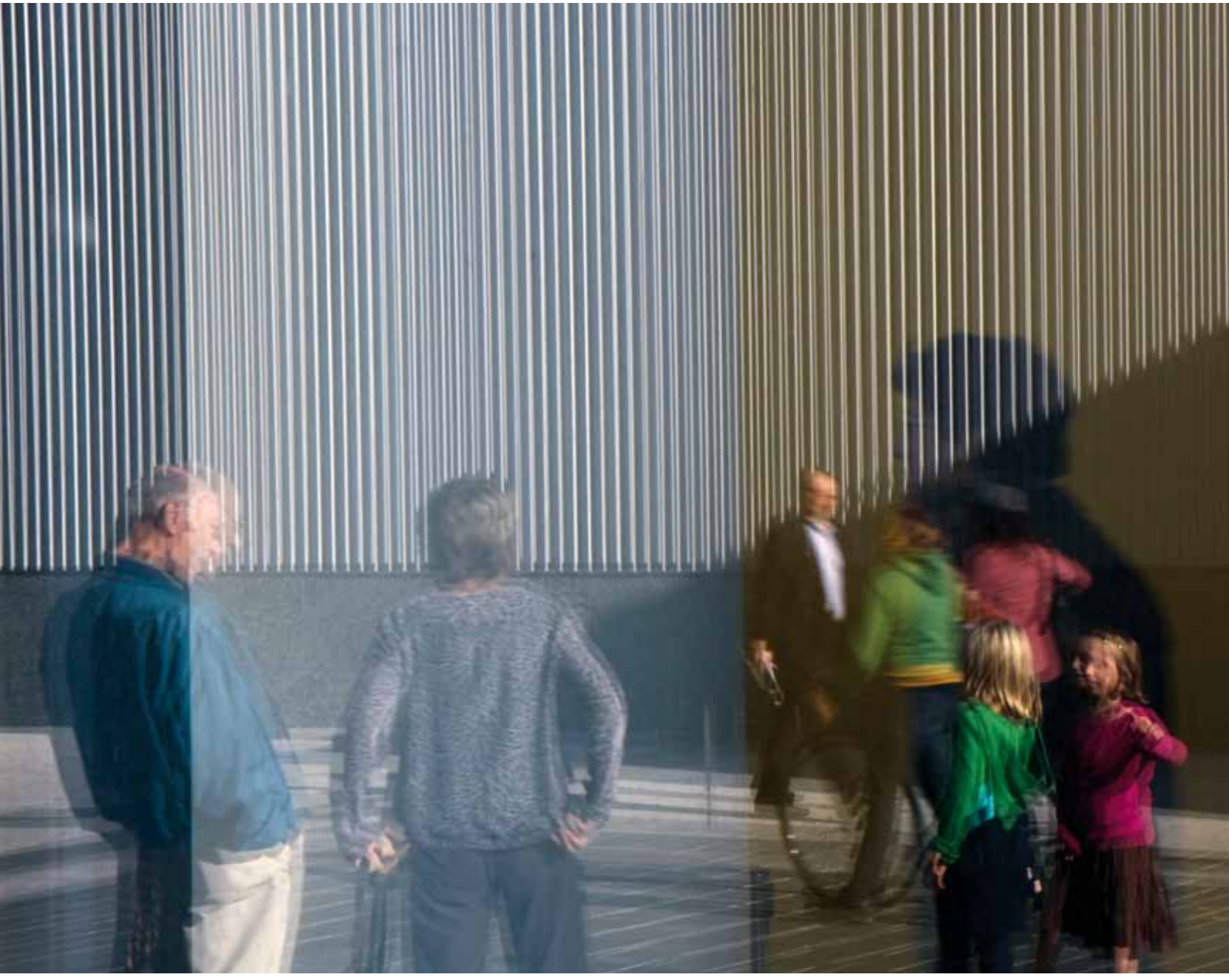

Preface

Urban development is by far the most rapid type of land use change in Europe. Regardless which future scenario we choose, urban expansion will continue at 0.5 – 0.7 % per year, which is more than 10 times higher than any other land use change. Areas classified as peri-urban are growing four times faster than urban areas, at a rate which, if continued, would double their area of 48,000 km² in 30-50 years.

Urban development has a lot of positive effects as a locomotive for economic development, but there are also many negative consequences of such rapid expansion. The results of the PLUREL project show that consumption of agricultural land will continue in all parts of Europe. Landscape fragmentation is concentrated in central western Europe, where only small patches of open landscapes remain. With increasing welfare, changing lifestyle and consumption patterns, peri-urban growth is likely to continue, especially in the conversion regions of south and central eastern Europe. Other negative consequences of urban sprawl are traffic congestion, decay of inner city areas, unhealthy life styles and social segregation.

A better balanced and more sustainable development requires more policy attention at the regional level and the urban-rural interface. When it comes to policy making, the time has come to challenge the conventional distinction between urban and rural issues. Instead, we need a more holistic, territorially integrated perspective to shape future EU Cohesion Policy, especially where it concerns economic development, social inclusion, transport, agriculture, environment and landscape.

New research from the PLUREL project quantifies the trends, risks and potentials for peri-urbanisation in Europe, and provides recommendations for targeted policies and new concepts of urban-rural linkages. This synthesis report, authored and edited by Annette Piorr (Leibniz-Centre for Agricultural Landscape Research, ZALF), Joe Ravetz (University of Manchester, UOM) and Ivan Tosics (Metropolitan Research Institute, MRI), is based on data, maps and written contributions from scientists representing 35 institutions from 14 European countries and China. PLUREL, an Integrated Project funded by the EU's 6th Framework Programme, started in 2007 and terminated in 2011.

PLUREL has approached the peri-urban issue on two administrative and geographical levels: the pan-European and the rural-urban region. This report focuses on the pan-European level, while the results of the studies on the regional level, based on six European and one Chinese case study, are presented in a forthcoming book published by Springer (Pauleit et al., 2011). During the research process, a fruitful and inspiring dialogue has taken place with the EC (DG Research, DG Regio, DG Agri and European Environment Agency), PURPLE, ICLEI and Eurocities.

I thank Thomas Sick Nielsen for his successful project management and all the authors of this synthesis report for their valuable contributions:

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Frederiksberg, December 2010
Dr. Kjell Nilsson
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Executive Summary

New research results from the FP6 PLUREL project show that urban development is by far the most rapidly expanding land use change in Europe. Urban development has a lot of positive effects as a locomotive for economic development, but it can also have serious negative social and environmental consequences, for example, through urban sprawl. A better balanced and sustainable development requires more policy attention at the regional level and on the urban-rural interface. The EU can promote an integrated rural-urban development by targeting its policies and funding towards peri-urban areas.

Facts on peri-urbanisation

- Today, the European areas classified as 'peri-urban' have the same amount of built-up land as urban areas, but are only half as densely populated.
- There is a real risk of increasing urban sprawl: The growth of built development of peri-urban areas will be up to 3.7 times as high as in urban areas.
- European-wide projections of built development in peri-urban areas are for 1.4 – 2.5% per annum – if such trends continue. Total built development in peri-urban areas could double between 2040 – 2060.
- Similar modelling on the impacts of urbanisation show that land fragmentation, loss of habitats and amenity values will all be more serious in the peri-urban than today.
- Meanwhile, the peri-urban is also a place of innovation and increasing employment in the service and IT sectors: 25% of peri-urban regions are classified as 'highly innovative'.
- New research from the EU Project PLUREL quantifies the trends, risks and potentials for peri-urban regions, and provides recommendations for targeted policies and new concepts of urban-rural linkages.

Energy wood plantation near Trieste, Italy

A New Kind Of Space

Why the peri-urban?

The peri-urban – the space around urban areas which merges into the rural landscape – is growing rapidly across Europe. There is about 48,000 km² of built development in peri-urban areas, almost equal to that in urban areas. But while most urban areas are now slow growing (at 0.5-0.6% per year), built development in peri-urban areas is growing at four times this rate.

There are many impacts of such rapid expansion. In many cases the result is sprawl, with increasing problems of social segregation, urban decline, wasted land, and dependency on oil for transport. However, there are examples of alternatives, with opportunities for improved quality of life, green infrastructure, better linkages between city and countryside, and more sustainable urban and rural development.

How to avoid the sprawl and achieve the opportunities? A wide range of trends, projections and policy responses have been investigated by PLUREL, an Integrated Project under the EU's 6th Framework Programme (EC FP6 036921). Emerging from this is a set of recommendations for policy.

Overall, the challenges of the peri-urban need to be addressed at the wider strategic level of the surrounding 'rural-urban region'. This requires more effective local government, alongside new forms of social enterprise and cooperation, for 'integrated development' (i.e. 'joined-up policy') in the rural-urban region. Achieving this is a multilevel agenda, from local to national and European. At this higher level, there are a range of options for EU action.

What is the peri-urban?

The peri-urban is the area between urban settlement areas and their rural hinterland. Larger peri-urban areas can include towns and villages within an urban agglomeration. Such areas are often fast changing, with complex patterns of land use and landscape, fragmented between local or regional boundaries.

- Peri-urban areas are defined in the PLUREL project as *'discontinuous built development, containing settlements of less than 20,000, with an average density of at least 40 persons per km² (averaged over 1km² cells)'* (figure 2, p.25).
- In the EU, there are nearly 48,000 km² of built development ('artificial surfaces') in areas which are classed as peri-urban, similar to the 49,000 km² in urban areas.
- The 'hot spots' – regions with the largest share of peri-urban land use and generally the highest rates of peri-urban growth – are mainly concentrated in the central Pentagon area (i.e. between London, Paris, Milan, Munich and Hamburg), but also in parts of central and eastern Europe. Of the 'top twenty' peri-urban regions, nine are in the Netherlands, five in the UK, and the others in Germany, Poland and Belgium.
- Rural-urban regions ('RUR') are the overall territorial unit for the PLUREL project. They include both the 'Functional Urban Area' (zone of daily commuting), and the surrounding rural hinterland. Figure 3 on page 27 maps 'statistical' rural-urban regions across the EU. However, in policy terms, the boundaries are flexible in order to respond to problems and opportunities.
- So, in summary: The urban area + peri-urban area = Functional Urban Area.
- And also: The urban area + peri-urban area + rural hinterland = rural-urban region (RUR).

Peri-urban areas suffer from urban pressures, but they also gain from proximity to urban areas, markets and cultures. The direct impacts of uncontrolled expansion of built development are focused on urban sprawl – defined by the European Environment Agency as *'unplanned incremental urban development, characterised by a low density mix of land uses on the urban fringe'*. Even without the expansion of built development, there are urban pressures on peri-urban areas: housing shortages, transport congestion, decline of landscape quality, economic restructuring and social change. On the other hand, there are positive effects, such as proximity to markets and work places, quality of life, and innovation.

What are the dynamics of change?

Urban expansion on a wider front is driven by economic growth and restructuring, new employment opportunities, growth of transport infrastructure, population growth and household change, as well as a decline of traditional rural economies. There are also more intangible factors, such as cultural values, lifestyles, social segregation, and urban/rural attitudes and perceptions. The combination of high economic growth with weak or fragmented governance generally produces the worst types of urban sprawl.

The PLUREL project developed a set of scenarios based on the global climate scenario scheme of the IPCC (2001):

- A1 – 'Hypertech': growth, technology innovation and out-migration to rural areas.
- A2 – 'Extreme water': rapid climate change, and defence against flood and drought.
- B1 – 'Peak oil': energy price shock, with re-population of cities and towns.
- B2 – 'Social fragmentation': communities in retreat into private enclaves.

For each of these a set of detailed models calculated the effects of economic growth, population change, environmental and technology factors onto land use change and built development up to the year 2025. The projections for an increase in built development (defined as 'artificial surfaces') are especially high in peri-urban areas at 1.4 – 2.5% per annum. In contrast, urban areas can expect growth rates of only 0.5 – 0.7%. If such trends continue, the total built development in peri-urban areas could double between 30-50 years. In practice, there are many localised differences within and between regions, depending on factors such as migration, transport systems and spatial planning.

There are implications for the EUROPE 2020 strategy, with its goal of "smart, sustainable and inclusive growth", which is almost in line with the innovation friendly PLUREL scenario A1 'Hypertech'. This economic development path tends to assume large amounts of new built development, but there are side-effects which don't appear in the strategy. The implication is clear – unless governance and spatial planning systems can be rapidly strengthened in some parts of eastern and south eastern Europe, the EUROPE 2020 strategy is likely to produce more urban expansion and uncontrolled urban development.

Peri-Urban Agendas

Economy and employment

Economic growth and restructuring often look towards lower density peri-urban locations. With the 'pull' of the global economy, and with the 'push' of urban overcrowding and congestion, there are strong pressures for the relocation of economic activity to peri-urban zones, with easier access to large sites and major roads.

There is also a capital accumulation dynamic. The peri-urban is often seen as a place to make higher profits at lower risk than in urban areas by landowners and developers, entrepreneurs and investors, and by house builders and house owners. Rural economic change also contributes as the decreasing labour intensity of agriculture combines with the influx of more affluent workers and retired households to rural areas. This generates demand for local service sector activities, and encourages the transition from rural to peri-urban economies.

The economic policy agenda revolves around '**peri-urban territorial cohesion**'**.** There are crucial differences between an urban-regional economy based on 'branch plants' serviced by commuter settlements and one which is diverse, resilient and sustainable. If the latter goal is to be achieved, policies and programmes should aim at capacity building for restructuring, diversification, and better urban-rural linkages, especially for entrepreneurialism, finance and markets.

Population and migration

Population changes in peri-urban areas show high contrasts. In the central and eastern EU, many rural areas depopulate, while urban areas experience modernisation, some with population decline and others with growth. In the western EU, many rural areas are re-populated by urban-based residents. In both cases, peri-urban change is about social and economic restructuring, as much as direct urban expansion.

In the future, as population growth is projected to level off, migration at various levels will become a greater influence. Demographic trends will widen the interregional gaps across Europe, so that more peripheral regions in central and eastern Europe have less chance of catching up. Europe-wide migration (in particular from eastern EU and from outside the EU), as well as national level migration will change the demographic structure, with effects on employment, lifestyles, cultures and communities.

The policy agenda is aimed towards communities which are balanced in age, class, ethnicity and occupations. Urban regeneration should increase the social and economic viability of inner areas, while rural development should sustain the rural social structure and balance. In between, the PLUREL research has identified the agenda for sustainable peri-urban communities, which combine old with new, and urban with rural. This is both a local issue for towns and villages in the peri-urban, and a strategic issue at the level of the rural-urban region.

Housing and communities

Social and cultural preferences for housing location can be a powerful driver for spatial segregation and social fragmentation. Most peri-urban development is due to families and older groups, and most housing in-migration is due to high income and education groups. This further encourages urban sprawl, gated communities and the removal of local community services from the peri-urban areas.

For the future, there are key drivers of change: rapid changes in lifestyles and housing location choices, teleworking, dual career households, as well as flexible household and retirement arrangements. Self-determined lifestyles often result in fewer people per household, with growth in housing area demand. Technology, such as on-line public services and shopping, is changing the structure of local centres and the pattern of housing and settlements. On the other hand, rising oil prices might constrain long-distance commuting.

The policy agenda aims towards social inclusion, integration and cohesion. Housing markets and allocation systems have the primary role to play. Housing locations should be accessible, environmentally sustainable and available for all social groups, as well as being integrated into the surrounding landscape. Positive support is needed for public and commercial services in peri-urban settlements, which are vulnerable to change and restructuring.

Mobility and transport

At present, low density urban sprawl causes longer commuting distances, increased infrastructure costs and less viable public transport systems. Urban expansion encourages car use, and car use encourages urban expansion. Improvements to infrastructure can reduce congestion and emissions, but often exclude the poor and those without cars, while encouraging longer distance commuting.

The PLUREL modelling looked at the effect of different spatial types. The transport system that has the lowest impact works with a monocentric settlement pattern with public transport modes. For a polycentric settlement pattern, multimodal and trans-modal systems are possible, but would require larger public investments.

To achieve the optimum is a challenge: how to coordinate and obtain investment into multimodal transport choices in a fragmented peri-urban area? Or how to locate urban developments and activities in the most accessible parts of the peri-urban? Each solution requires stronger and more strategic governance at the level of the rural-urban region.

Food and farming

Food security is one of the first priorities for the EU, but there is a critical interface between agriculture and peri-urban land use change. At present, regions with strong agriculture sectors, combined with the highest proportions of peri-urban areas, include north west Germany, Denmark and the Benelux, large parts of Poland and Hungary, southern UK, western France and eastern Italy. Conflicts often arise where urban expansion destabilises rural economies, patrimony systems and land markets. There is also great potential, where peri-urban farming provides local or high value products, in a more sustainable multifunctional landscape.

Future trends will depend on biotechnology, on climate change, water and soil, on fertilizers and the possibility of 'Peak oil'. A key factor is the changing rural economy and the availability of labour, full-time or part-time. The PLUREL scenario modelling projects a general increase in farm productivity, as former low-capital and small scale farming is modernised. Some scenario projections show the doubling of peri-urban areas in 30-40 years, and peri-urban agricultural areas (many of them with the highest quality land) could be reduced by up to 15%.

Overall, the agriculture policy agenda aims to turn the conflicts between agriculture and peri-urban into opportunities – employment and quality of life in diverse, productive, multifunctional landscapes. Success will depend on a new peri-urban focus that links agricultural policy with wider agendas, such as climate change and adaptation, public health and food quality, leisure and community services.

Landscape, ecology, recreation, and tourism

Large parts of the European environment are under pressure from peri-urban development. This affects many types of 'ecosystem services', including biodiversity, water supply, flood control, soil quality, landscape aesthetics and the capacity for climate change adaptation. The concept of 'ecosystem services' is a key theme for peri-urban policy. Moreover, many of Europe's wide variety of landscapes – places for recreation and regional identity – are endangered by further urban growth, as shown by the PLUREL modelling results. This negatively affects flows of matter, energy and species, such as the fragmentation of habitats and reduced groundwater recharge etc.

As to the future – the PLUREL scenario modelling anticipates higher growth of artificial surfaces in areas which are already under the most pressure. On the social side, peri-urban areas are under pressure from recreation and tourism: Where the local 'brand' and image lead the way, then housing and services often follow. The demographic shift towards a semi- or non-working population is also a 'leisure shift', with the result that large peri-urban areas are in 'golf course' or 'horsiculture' uses for affluent consumers.

The policy agenda includes the goals of multifunctional landscapes, sustainable resource management, conservation of habitats and cultural landscapes. But in reality, there are challenges – how to manage and fund 'ecosystem services' in a fast changing peri-urban context? And how to develop coordination and cooperation in a fragmented and undefined territory? Such challenges suggest the need for a new kind of multilevel, multifunctional governance.

Managing Growth

The problem of uncontrolled urban sprawl can be seen as a market failure. Society would be better off as a whole by coordinating development, but often lacks the means to do so. This is a problem not only of urban expansion, but urban shrinkage (particularly in older industrial areas), which also causes and is caused by expansion.

In reality, there is often fragmentation between government units, and a 'governance gap' for decision making and investment. There is therefore an urgent policy agenda to set up or enable such bodies. The PLUREL research looked at three main issues:

- Firstly, there are general problems with the capacity of the formal government system and planning policy regime to control land use changes in most EU member states. The PLUREL project analysed the level of organisation, the level of democratic control, and the level of fragmentation of governance structures in a typical rural-urban region;
- The question of spatial planning follows in relation to its lack of legal strength and capacity for cross-border coordination, and its lack of influence on infrastructure provision. Besides, there are problems with the NIMBY ("Not In My Back Yard") and similar lobbies and political movements, with incentives for continuing urban sprawl;
- Thirdly, financial and taxation mechanisms often create incentives for urban sprawl, either directly (e.g. linking public support to population number) or indirectly (through local tax competition). Each country needs to review its system for local or regional taxation and reinvestment. This can involve both the public sector and also new kinds of partnerships, such as for 'ecosystem services' and social reinvestment.

European policy agendas

Policy Response

National or EU policies rarely take the peri-urban sphere into account, and the peri-urban (often cross-cutting administrative boundaries) rarely makes the best use of policies and funding. Many peri-urban areas qualify for either urban or rural development funding from various sectoral budgets. But this is rarely focused on place-specific requirements, and there is a hidden risk of uncoordinated development and urban sprawl.

Meanwhile, it is clear that peri-urban areas have great potential and great opportunities. So we need to refocus policy to address this. At the EU level, this applies particularly to the Structural and Cohesion Funds, as well as the CAP and various transport/environment policies. Around 20% of the total Structural Funds in the Programming period 2007 – 2013 will be spent in rural areas, and around 32% in urban areas. The Structural Funds and associated programmes have an indirect but powerful effect on peri-urban development, as well as in regions which are predominantly peri-urban.

In terms of agriculture, countries with large peri-urban areas spend more of the Rural Development budget for diversification measures than those countries which are mainly rural. In most other countries, investment support and agri-environmental payments are the main focus of Rural Development funding. In terms of better policy targeting, it has to be stated that the potential for rural-urban linkages has not yet been realised. In future, the CAP should focus on these linkages, with a more multifunctional landscape of urban, peri-urban and rural food production with short supply chains, peri-urban leisure activities, sustainable landscape management and urban-rural LEADER initiatives.

In some countries, more than 10% of NATURA 2000 sites are in peri-urban areas. While Rural Development programmes support extensive agriculture and diversification in such peri-urban areas of high ecological value, other measures such as LEADER do not.

Towards EUROPE 2020

Current and projected development trends are likely to bring rapid changes to peri-urban areas:

- Globalisation and innovation. Conventional economic development often takes peri-urban land as the location for large scale industry, science and business parks, roads and other urban infrastructure;
- Demographic change. The shrinking of some regions, the ageing of many others, and one-sided migration tendencies bring challenges to the population stability of peri-urban areas, lead to Europe-wide unwanted restructurings of population, and further widen the gap between over- and under-populated areas;
- Climate change impacts combined with urbanisation and fragmentation of peri-urban areas resulting in flooding and sea-level rise in some areas, while in others, soil erosion and habitat loss. Energy shortages will change the viability of peri-urban transport, while the search for renewable sources will claim peri-urban land use.

EUROPE 2020 is a potential driver of policy innovation for "territorial cohesion", integrating economic, environmental and social aspects. But achieving the Lisbon Agenda, on current trends, is likely to produce urban sprawl on a massive scale. So, there is a need for a stronger policy focus on the peri-urban agenda, particularly in terms of major financial interventions. EUROPE 2020 could become an opportunity for new thinking on core agendas in the peri-urban. This would require, however, a multilevel approach, particularly with national government systems, planning policies and financing for local and regional development.

Integrated Development and EU Policy Options

Government and governance for integrated development

A strong and democratic government is the precondition for the management of market forces for public benefit. In peri-urban areas, there are particular problems of fragmentation, under-investment and 'winner takes all' conflicts. Therefore, the government at the local and rural-urban region level needs to focus on its effectiveness and outcomes:

- The local government financing system and source of revenue. This should avoid fiscal incentives that lead to wasteful competition for houses or investments;
- The local taxation system. This should encourage balanced development for business and households, and avoid tax incentives for urban sprawl;
- Sectoral policies and subsidies for infrastructure, transport, housing or agriculture. Each should aim at diverse and resilient patterns of development, for instance, with multi-modal transport planning;
- Spatial planning and regulatory coordination of development, land use change and especially larger projects aiming not only at restrictions, but also the positive enabling of polycentric diversified activities;
- Finally, effective mechanisms for cooperation at the level of the rural-urban region, aiming towards joint strategic planning rather than a 'winner takes all' competition for development.

There is also an agenda for more responsive 'bottom-up' forms of governance – not to replace formal policies, but to work alongside them and fill in any gaps. The PLUREL case studies identified 'new institutional' partnership models for collaboration between public, private and community sectors. There are also 'policy intelligence' models to deal with complex problems, and 'social entrepreneur' models to mobilise resources in the social economy.

In parallel, there are 'territorial models' for integrated spatial development. At the rural-urban region level, strategic planning should promote low-impact infrastructure and public services in sustainable settlement forms. This then applies to many territorial types: from the airport zones and business parks, to large urban infrastructure, to towns and villages, and to multifunctional landscapes connected by green-blue infrastructure.

Overall, there is a policy menu for putting the whole picture together – i.e. managing the peri-urban through **'integrated development models for rural-urban regions':**

- **Spatial strategy** – policy framework at the level of the rural-urban region to coordinate peri-urban development and low-impact infrastructure, and to set up controls and incentives to avoid sprawl. Focus on the potential for zoning, such as green belts, to be positive catalysts more than restrictions;
- **Economic strategy** – peri-urban diversification and resilience of local economies and employment involving rural diversification and multifunctional land-based activity, as well as urban regeneration with improved urban-rural links. Focus on the social economy in the peri-urban, and on mobilising hidden resources;
- **Social strategy** – housing and service provision to encourage balanced, inclusive and resilient communities. Focus on the needs and opportunities in different settlement types, and on social functions and values provided by peri-urban areas;
- **Environmental strategy** – ecosystem services policy and investment system involving climate change mitigation and adaptation, landscape and habitat conservation, and multilevel green-blue-infrastructure. Focus on diversified, resilient, multifunctional agriculture and forestry;
- **Governance strategy** – strong and democratic municipal government focusing on healthy finances and fiscal policy, a capacity for investment in infrastructure, playing an active role in the local economy, and transparency with public and stakeholder participation. Focus on the capacity for strategic and cross-border coordination at the level of the rural-urban region.

EU policy options

The agenda for managing the peri-urban is multi-level: from the local to the rural-urban region, to the national and European levels. Policies and programmes at the European level may be part of the problem or they may be part of the solution. So there is a new agenda for EU policies and funds with any kind of linkage to spatial development and territorial cohesion. In particular, the PLUREL results show that to meet the challenges of the EUROPE 2020, we need to refocus and retarget EU policy and investment to include for its effects on peri-urban change.

To do this, the core objectives of EU policies and funding programmes should include support for territorial 'integrated development models for rural-urban regions'. And by implication, if an EU intervention appears likely to produce urban sprawl, it should not proceed. To support this, in the optimal case, a system of definitions and boundaries will be needed (to be developed by the nation-states, along a given EU framework regulation), so that clear targets and benchmarks can be drawn.

So, how to make this work for Europe? We set out here five possible 'options' for EU-level policy and/or financial intervention that would promote 'integrated development models for rural-urban regions'. The most effective option is first, and the fall-back option is last.

1. EU DIRECTIVE for Integrated Rural-Urban Development:
A legal mandate and operational structure for 'integrated development models for rural-urban regions'. The target is defined in the form of framework criteria, with a focus on the procedural system. Following the example of the Water Framework Directive, this involves not only EU financing, but all forms of development.

2. EU CONDITIONALITY for Integrated Rural-Urban Development:
For access to European financing (Structural Funds, CAP etc) integrated development plans would have to be prepared on the rural-urban region level, and approved by relevant authorities. Rural-urban regions would be accepted as the main territorial basis for EU financial programming and assistance.

3. EU COMMUNITY INITIATIVE for Integrated Rural-Urban Development:
A dedicated fund would be allocated among the member states to be used directly for specific pilot and demonstration projects (following the example of the pre-2007 version of the URBAN Community Initiative).

4. EU Open Method of Coordination for Integrated Rural-Urban Development:
Benchmarking and indexing with a common support system. Member states would prepare a National Action Plan, with a capacity building programme of best practice, skills development and policy advocacy.

5. EU Reference Framework for Integrated Rural-Urban Development:
An advisory service with some technical backup, including guidance, tools and documentation.

Each of these options recognises the immense challenges of peri-urban change, and the impacts of current EU and national policy. They also need to recognise the potential of positive visions, strategic goals and integrated policy frameworks to generate new opportunities for all involved.

A NEW KIND OF SPACE

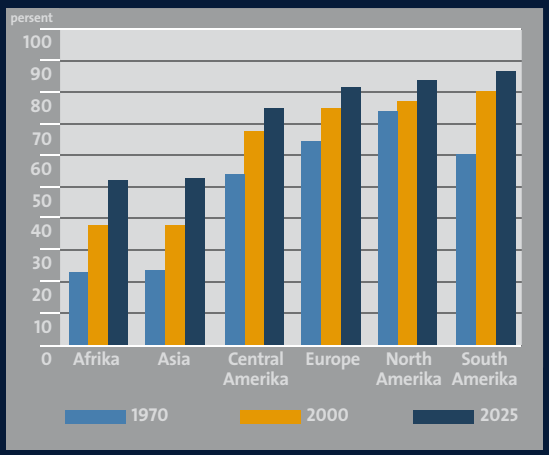
Why the peri-urban?

Urban areas are expanding due to a combination of population growth and outward spread of urban activities. The result is that urban and rural areas are no longer separate territories. The newly emerging 'peri-urban' areas are the site of the most dynamic changes. Peri-urban problems and opportunities are best addressed at the level of the rural-urban region, which includes both peri-urban and rural hinterland areas.

Urban sprawl and the consequences

In 2008, for the first time in human history, the number of people living in urban areas exceeded the rural population. Urbanisation is a worldwide phenomenon. The World Resources Institute (2001) estimated that in 2025, more than 50% of the African and Asian populations would be living in urban areas. In central and south America, these figures will be between 75 and 85% (figure 1).

Managing urban population change will be one of the most important challenges during the next decades, along with moderating the impacts of climate change. In developed countries, the urban future will involve dealing with complex changes in the composition of urban populations and containing urban sprawl beyond the suburbs to retain the critical ecosystem services that will sustain population growth. In developing countries, where 80% of the world's population resides, central issues will be how to cope with an unprecedented increase in the number of people living in urban areas, and with the



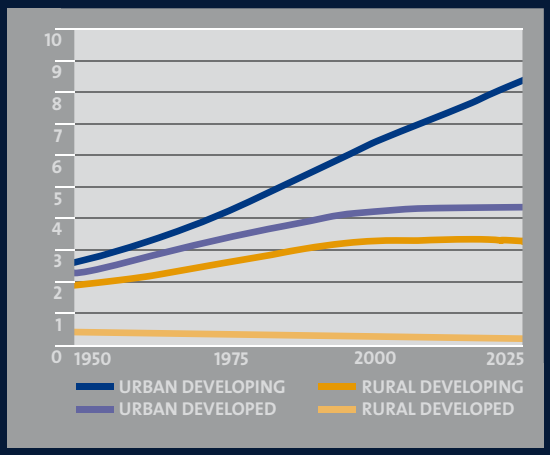


Figure 1: Estimated urban population by region. Figures from World Resources Institute (2001)

growing concentration of these urbanites in large cities with millions of residents and declining availability of natural resources.

In the decade 1990 – 2000, the growth of urban areas and associated infrastructure throughout Europe consumed more than 8000 km² – equivalent to the entire territory of the state of Luxembourg, or 0.25% of the total area of agriculture, forest and nature land (EEA, 2006). This is an almost irreversible process, since less than 10% goes the opposite way, i.e. is transferred from urban land into brownfields, and only a minor part of these are reclaimed for arable land use or nature. An important driving force behind urban expansion is, of course, the growth of the urban population. An equally important effect, however, is the 'per capita sprawl': cities have become much less compact. Since the mid 1950s, European urban areas have expanded on average by 78%, whereas their population has grown only by 33% (EEA, 2006). Even in regions where the population is decreasing, urban areas are still growing, notably in Spain, Portugal, Italy and in eastern Germany. Leipzig-Halle is an example of a region which suffers from both the problems of a shrinking city and urban sprawl. The same trend – that urban areas expand faster than the population – can be seen in the United States and China (Nilsson and Nielsen, 2010).

The dominant spatial form of the continued urban expansion processes is urban sprawl, which blurs of boundaries between what is urban and what is rural. Infrastructure, activities and inhabitants affect rural zones at a growing distance from the city centres, causing land use changes, land use competition, and social and economic changes in what were previously rural areas. The rural landscape is no longer simply for agricultural production and residential use, but also for purposes of recreation and amenity.

It is no longer easy to argue for the traditional split between the two geographies of urban and rural Europe. In most countries, urban centres have long since lost their particular privileges, and there is no longer a clear difference in the administrative status between town and countryside. The rural life is urbanised by transcending commodity relations, and lifestyles are organised around mass consumption regardless of location (ESPON, 2006).

There are increasing conflicts between urban and rural uses that need to be addressed (Mcrit, 2010). For example, water availability for agriculture versus water to drink and for industry, using land for agriculture or to urbanise and build upon, and unaffordable housing prices due to increased demand as metropolitan expansion or residential tourism takes place.

As differences between urban and rural become decreasingly clear-cut, it is difficult to analyse urban and rural areas separately, but instead as fuzzy territories composed of mixed areas, from more the densely urbanised to diffuse and disperse zones and isolated towns (Mcrit, 2010). The terms 'rural' and 'urban' refer increasingly to social attitudes and stereotypes, or narratives, than to real places. Urban areas can be found in rather rural landscapes, such as urban sprawl, in commuting areas of a major metropolis, large food processing districts and scientific clusters, while rural areas can be found within urban environments, namely urban farming and gardening, urban forestry and agricultural communities within metropolitan areas.

The spatial context: The rural-urban region

PLUREL deals with the problems of urban expansion through the lens of the rural-urban regions (RUR). This concept can be considered as the spatial extension of the Functional Urban Area (an urban core and its surrounding commuting ring, see e.g. ESPON 1.1.1 (ESPON, 2005)), including both the peri-urban and rural part of an urban catchment up to a distance where daily commuting ceases due to travel times becoming too long. Areas of recreational use, food supply and nature conservation located in predominantly rural areas are also part of the RUR. Rural-urban regions can also be described as spatial clusters of three interrelated regional sub-systems – the urban zone, the peri-urban surroundings and the rural hinterland, all characterised by different structures, functions and relations which are reflected through different land use classes.

It is a natural wish of many families to increase their quality of life by acquiring low-rise single family residences on larger plots. However, the advantages of the individual families must be balanced against the negative impacts of urban expansion. These impacts depend to a large extent on the spatial pattern of urban growth: polycentric development is less harmful then unlimited urban sprawl.

Empirical investigations have resulted in long lists of negative impacts related to urban sprawl. Most well known are the environmental impacts. For example, the consumption of mostly non-re-

newable resources such as land and soil, as well as the negative effects on the ecosystems functions, the environmental impacts such as poor air quality and high noise levels etc. But there are also economic impacts (the loss of concentration and economy of scale, and the increase in travel needs between work and home) and social impacts (greater residential segregation of different social classes) (see e.g. SCATTER, 2004).

The peri-urban area is the dynamic transition zone between the denser urban core and the rural hinterland, consisting of a lower density discontinuous urban fabric and a mix of residential, commercial and leisure-related land uses. Peri-urban areas exhibit throughout Europe very different characteristics regarding spatial structure and density of the different land uses, ranging from continuous low density urban fabric, to scattered medium density settlements and commercial sites; from dense horticultural areas to arable and range land, to forests and natural areas.

The peri-urban is not just an in-between fringe. It is instead a new and distinct kind of multifunctional territory, and often the location for opportunities such as airports, business parks and high value housing, which are all seen as essential to urban/regional development. However, in most cases, it is also the location for problems: urban sprawl, wasted public funds, traffic congestion, agricultural land under pressure, damage to landscapes and biodiversity, fragmented communities and social polarisation.

The dynamics of development in the peri-urban areas

With some simplifications, two types of actors can be identified in the peri-urban areas: the moving actors (households of different income levels, industry/businesses and retail/leisure centres) and the non-moving actors (key actors in the development process such as landowners, developers and local and supra-local governments of the RUR region who are responsible for planning, regulating, financial influencing, investments/taxing, see URBS-PANDENS, 2005).

Peri-urban areas are among the main target areas for urban development within rural-urban regions. There are strong interests for peri-urban development – both from a demand and a supply perspective. The demand aspect is dominated by the expectations of the moving actors:

- Urban residents, aiming to leave less attractive, densely populated urban centres, while seeking affordable, attractive residential areas that promise a higher quality of life through good infrastructure, better safety and security, a cleaner environment, nearby open space and reasonable accessibility to their (urban) workplaces;
- Developers and investors, locating businesses and commercial centres to peri-urban areas that promise easier access to markets and higher profit with less investment. Entrepreneurs establishing new companies supplying the new residents with goods and services and benefitting from the potential pool of skilled workers in the vicinity.

The heavy pressures by the moving actors on peri-urban areas are usually accompanied by efforts of the non-moving actors to satisfy these expectations. Municipalities surrounding larger cities are zoning new building land and applying liberal building regulations as a means of attracting new residents and workplaces to increase their revenues from local taxes or larger shares of national tax revenues. Landowners and developers are partners in these efforts, the more so since they are the receivers of large parts of the land value increase.

Urban sprawl as a policy challenge

Urban expansion is a natural process. However, it is a difficult policy challenge to steer this process and avoid urban sprawl. Peri-urban areas and their problems cross many administrative and sectoral boundaries, and they are rapidly changing locations towards both success and failure side-by-side, in social, economic and environmental terms. For all these reasons, effective policy responses are likely to be multilevel, multiagency and multifunctional.

Today there is a clear need for peri-urban thinking, coming from at least three sides, and for slightly different reasons. Rural stakeholders and environmentalists are directly interested in resisting the urban push for land use change of the green. Urban stakeholders and protagonists of sustainable development are looking for the most suitable level of territorial governance for complex and contradictory urban problems which cross municipal boundaries. Finally, at least some of the EU stakeholders aim to tackle the controversies of EU fund regulations, and are looking for spatially integrated interventions to replace single-sector policies that usually have large externalities. There is growing awareness that the major EU interventions – Cohesion Funds and Common Agricultural Policy (CAP) subsidies and programmes – largely ignore peri-urban issues and sometimes even contribute to the sprawling version of urban growth.

View from the old town of Sibiu towards the urban fringe, Romania

Concepts and methods

The peri-urban is a zone of transitions between urban settlements and their rural hinterland. Here we introduce concepts and definitions of the peri-urban within the wider context of the 'rural-urban region'. The technical analysis and typology shows the distribution of peri-urban areas and the locations of 'hot spot' concentrations around Europe.

Definition of peri-urban as transition zones

The peri-urban is a zone of transition between urban and rural areas. In many cases, this zone changes rapidly as the urban area expands and restructures, while in some regions it is carefully managed and preserved. Increasingly, the peri-urban is also recognised as a spatial type and territory in itself, characterised by a dispersed and non-contiguous fabric of built-up and open spaces surrounding the urban core areas.

To understand the peri-urban area and the dynamics of change, we need to explore the spatial context more extensively. Within the PLUREL project, a 'rural-urban region' (RUR) has been defined as the main unit of analysis, with a range of area types shown below as nesting circles (figure 2). (Note that the meanings of each of these areas may vary between different countries and languages. A technical definition of the rural-urban region is shown in the next section). These area types include:

- Urban core – which includes the Central Business District and other civic functions;
- Inner urban area – generally higher density built development (built-up areas);
- Suburban area – generally lower density contiguous built-up areas that are attached to inner urban areas and where houses are typically not more than 200 metres apart;
- Urban fringe – a zone along the edges of the built-up area, which consists of a scattered pattern of lower density settlement areas, urban concentrations at transport hubs and large green open spaces;
- Urban periphery – a zone surrounding the main built-up areas with a lower population density, but belonging to the Functional Urban Area as described below. This can include smaller settlements, industrial areas and other urban land uses;
- Rural hinterland – rural areas surrounding the peri-urban area, but within the rural-urban region.

The **peri-urban area** includes both the urban fringe and urban periphery. This is defined for the PLUREL project as: *'discontinuous built development containing settlements of each less than 20,000 population, with an average density of at least 40 persons per hectare (averaged over 1km cells)'* (Loibl and Köstl, 2008).

Each of these area types is contained within a whole urban system. A number of different concepts related to urban system units with different boundary definitions are in use. Some of these are vague and some are quite specific. The PLUREL project focuses on two classifications:

- **Functional Urban Area (FUA):** *"an urban core and the area around it that is economically integrated with the centre, e.g. the local labour market. Belonging to a commuter catchment area, FUAs represent common local labour and housing markets."* (ESPON Report 1.1.1 (ESPON 2005))
- **Rural-urban region (RUR):** *"spatial clusters of three interrelated regional sub-systems – the urban core, the peri-urban surroundings and the rural hinterland. Areas of recreational use, food supply and nature conservation located in predominantly rural areas are also part of the rural-urban region."* (PLUREL Description of Work 2009, p11). Rural-urban regions are the overall territorial unit of analysis for the PLUREL project. They include both the 'Functional Urban Area' (zone of daily commuting) and the surrounding rural hinterland. A technical calculation method for rural-urban regions is shown in table 1 and in figure 4. However, in policy terms, the rural-urban region boundaries are flexible in order to respond to problems and opportunities.
- So, in summary: the urban area + peri-urban area = Functional Urban Area.
- And also: the urban area + peri-urban area + rural hinterland = rural-urban region.

Figure 2 shows two interpretations of this scheme. The upper sketch is a simple text-book depiction of a monocentric settlement pattern surrounded by nesting circles. The lower sketch is a more realistic version: a polycentric agglomeration of settlements with different sizes and patterns surrounded by a rural hinterland with a complex boundary. In the polycentric version, the peri-urban areas do not only surround the urban, they are also a geographical type and territory unto their own, and the reality on the ground is often complex and fast changing. FUAs overlap and merge to form urban agglomerations, existing settlements change their shape and function, and in larger FUAs, there are many areas with a combination of infrastructure, housing, industry, open space and land in transition – a challenge by any definition.

Another issue is data. Generally we are required to refer to the NUTS system (Nomenclature of Units for Territorial Statistics), which is a geocode standard for subdivisions of countries for statistical purposes of territorial classification across the EU. The NUTS boundaries (e.g. NUTS0 national, NUTS2 region, NUTS3 district) often do not fit with any of the boundary definitions above, which makes researching these units even more challenging.

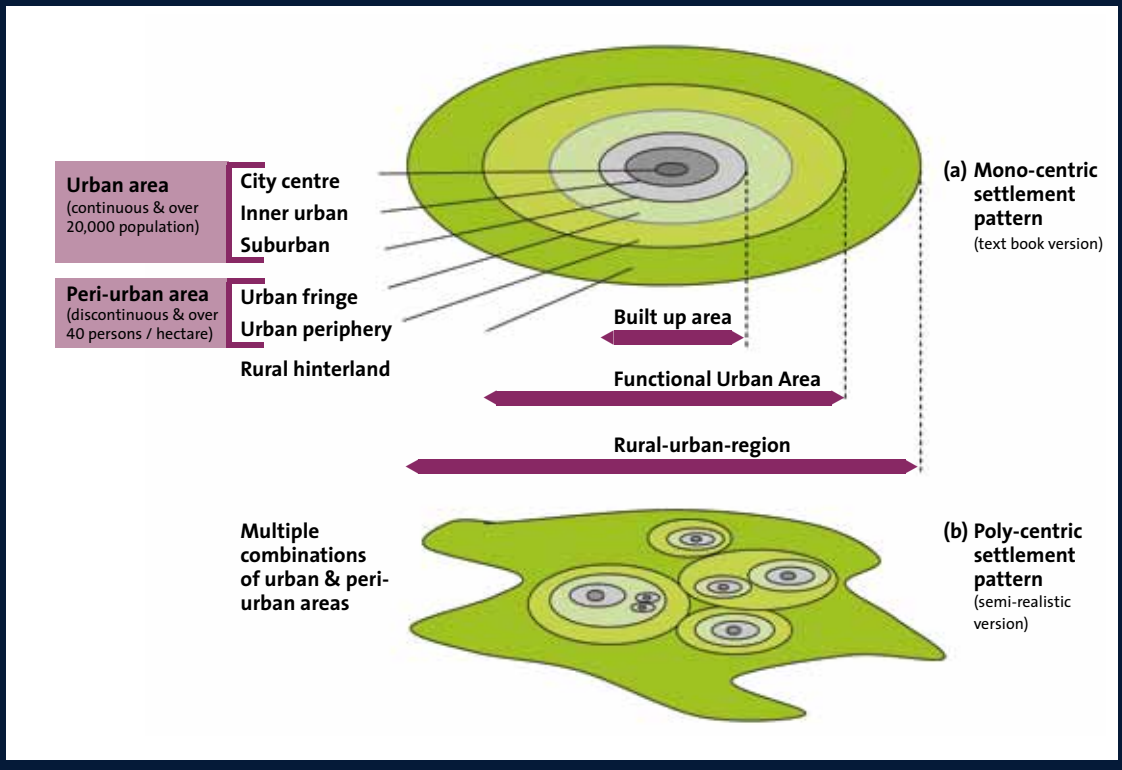


Figure 2: Peri-urban areas & the 'rural-urban-region'

Geographic concepts & definitions as used in the PLUREL project

Source: UOM, ZALF, MRI

The first and foremost problem in peri-urban development is **urban sprawl**, which is generally seen as a land use pattern with lower density, inefficient land use, car dependency and other characteristics. But many questions arise, e.g. which scale or spatial unit is to be used? Is an airport or industrial complex to be defined as urban sprawl or economic development? A more technical definition singularises low values in one or more of eight factors: density, continuity, concentration, clustering, centrality, nuclearity, mixed uses and proximity (Galster et al., 2001). In simple terms, we use two definitions for sprawl: *'unplanned incremental urban development characterised by a low density mix of land uses on the urban fringe'* (EEA, 2006) and also; *'low density, scattered urban development, without systematic large scale or regional public land use planning'* (Bruegman, 2008: p18; Reckien and Karecha, 2007).

There is a range of other problems examined in this report, each stemming from 'peri-urban development' or **'peri-urbanisation'**. This is a quite flexible concept that relates to the conversion of urban or rural areas into peri-urban areas as defined above. This conversion is often rapid and unpredictable. In countries with weak spatial planning, it can result in a physical development which drives social and economic change. On the other hand, social, economic and cultural changes are also significant in countries with strong spatial planning that controls physical change.

Overall, the PLUREL project has developed a practical working method for defining the peri-urban and the rural-urban region concepts, as well as for investigating urban sprawl problems. This method became the basis for a more technical analysis as described below.

Motorway M1, Dublin county, Ireland

The rural-urban region method and typology

RUR Typologies for Europe

A technical analysis of peri-urban patterns and changes needs to take into account the context of the surrounding rural-urban region (RUR) from analytical and functional aspects. This requires a physical delineation of the rural-urban regions (RURs) into their respective sub-areas, while the exploration of peri-urban issues across Europe requires a simple typology. Such a typology was developed in PLUREL with certain assumptions: (1) that the RURs would cover all of the EU-27, (2) RUR boundaries would be compatible with NUTS3 sub-region boundaries so that EUROSTAT data is available, (3) and that the RUR typology would be practical to calculate, even with limited data availability.

The PLUREL method defined a total of 903 RURs for the EU-27. It also developed three different ways to analyse urban–rural relationships and patterns:

- Settlement morphology (based on the number and size of urban centres);
- Development dynamics (based on core city dynamics versus peri-urban dynamics of growth and shrinkage);
- Land use and population density. This typology provides a spatial definition of three types of territory within the RUR, namely urban, peri-urban and rural.

In the summary of this work, we focus on the third method based on land use and population density. This then applies to both lower and higher levels:

a) Lower level (detailed analysis carried out inside each of the rural-urban regions);
b) Higher level (comparitive analysis between the rural-urban regions across Europe).

Lower level: Area types within the rural-urban region

At the lower level, each area type is further divided into two sub-classes since the urban, peri-urban and rural types across Europe show a range of land uses and densities. Table 1 shows a total of six area types with working definitions. Figure 4 shows examples of

Figure 3: RUR subregion delineation

Baseline Situation 2001

RUR delineation

- **0 – unpopulated**
- **1 – urban**
- **2 – peri-urban**
- **3 – rural**

Source: AIT, EUROSTAT, JRC

this application at a higher resolution scale for six rural-urban regions: Manchester, Montpellier, Warsaw, Leipzig, Koper and Haaglanden. These regions have been the main case-study regions within the PLUREL project. For each region, there is in-depth analysis that focuses on governance and spatial planning, combining stakeholder participation, policy analysis and spatial scenario modelling (Pauleit et al., 2011).

A simplified result for the entire EU-27 is shown in the 'spatially explicit' map of rural-urban regions, which depicts urban, peri-urban and rural areas in a 1km2 grid resolution (figure 3). The borders of the regions are NUTSX, a unit which, in some countries, refers to NUTS 2 regions and to NUTS3 regions in others (Renetzeder et al., 2006). This unit was chosen in order to achieve a more harmonised size of NUTS

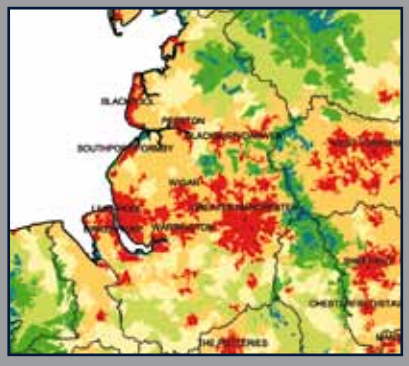
U_1: urban high density:	urban fabric class inside U_2
U_2: urban low density:	urban fabric (without urban green, industry) and population > 20.000
P_1: peri-urban high density:	population density > 75 inhabitants/km^2 or population > 10.000 and inside P_2
P_2: peri-urban low density:	population density > 40 inhabitants/km^2 and adjacency to the U_2 sub-region
R_1: rural high density:	population density > 10 inhabitants/km^2
R_2: rural low density:	population density > 0 inhabitants/km^2

Table 1: Rural-urban-region area types

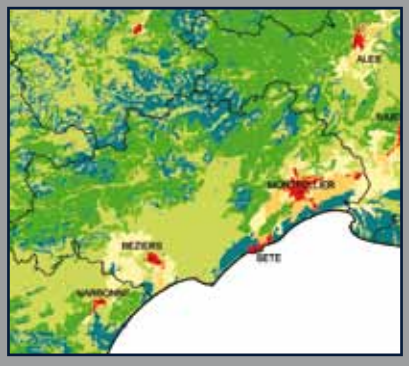
Table 2: Summary of baseline data

	total artificial surface area (km^2)	total land area (surfaced + non-surfaced)	proportion of surfaced / total land area	Residential population by area type (millions))	overall residential density (persons per km^2)	residential density on artificial surface (persons per hectare)	proportions of population
Urban area type	48,765	61,649	79.1%	234.9	3,810	48	50.0%
Peri-urban area type	47,532	572,669	8.3%	118.0	206	25	25.1%
Rural area type	72,182	2,887,273	2.5%	116.7	40	16	24.9%
Un-populated (rock, ice, water)		5,626					
TOTAL EU (2000 base: excluding Bulgaria)	168,478	3,527,217	4.8%	469.5	133	28	100.0%

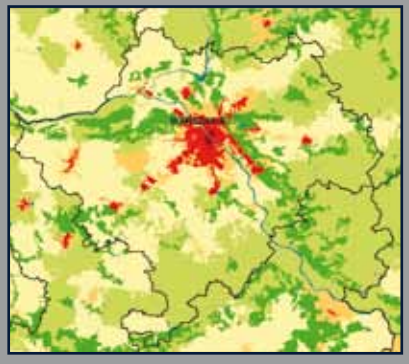
Figure 4: RUR delineation in PLUREL case study regions



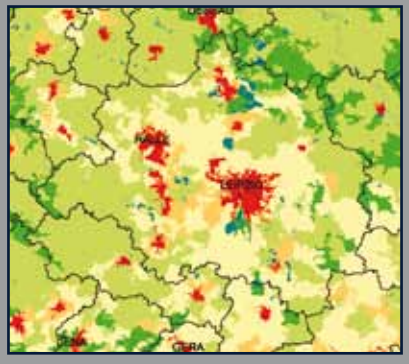
Manchester, UK



Montpellier, FR

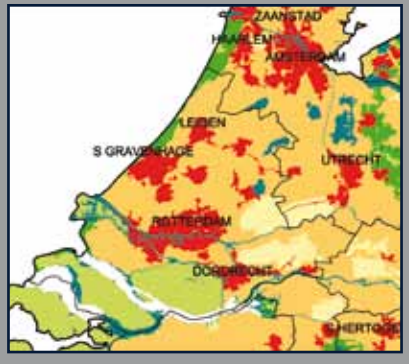


Warszawa, PL



Leipzig, DE

Koper, SI



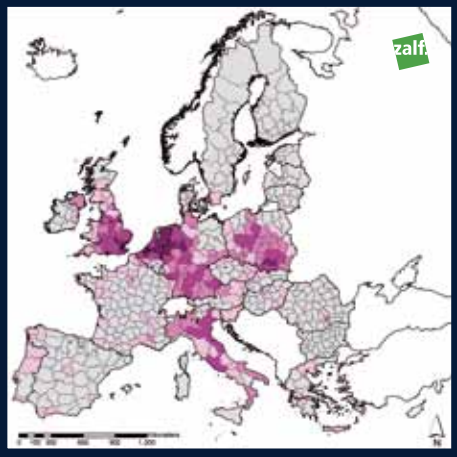
Haaglanden, NL

RUR delineation (6 classes)

- urban high density
- urban low density
- peri-urban high density
- peri-urban low density
- rural high density
- rural low density
- rock, glacier, water
- no data

Source: Austrian Institute of Technology, AIT

Figure 5: Hot spots of peri-urbanisation



Share of Peri-Urban Surface per NUTSX region

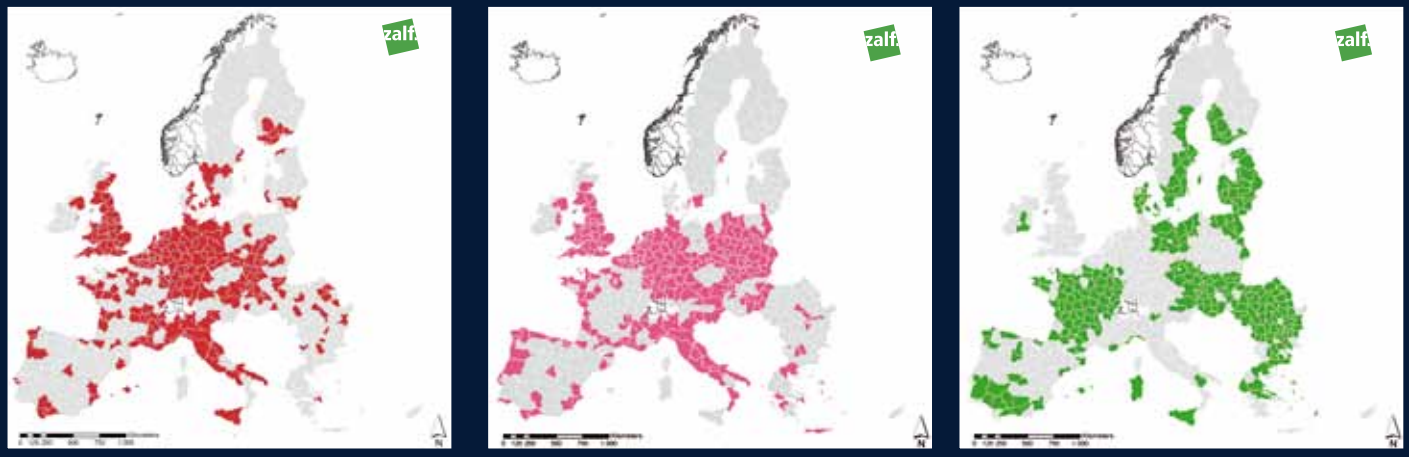
in % of total area

- 0 – 10
- > 10 – 30
- > 30 – 50
- > 50 – 70
- > 70

Table 3: Top 20 peri-urban regions in the EU-27

NUTSX Code	NUTSX Name	Peri-urban Area (RUR2) in %	Artificial Surface CLC in %
NL21	Overijssel	88,51	8,02
NL13	Drenthe	88,37	5,52
NL12	Friesland (NL)	87,30	5,23
DEA3	Muenster	86,09	9,88
NL11	Groningen	85,20	7,08
NL42	Limburg (NL)	83,37	14,50
UKH3	Essex	82,64	10,22
NL41	Noord-Brabant	82,18	13,00
PL211	Krakowsko-tarnowski	78,15	4,45
DEA4	Detmold	78,00	9,67
BE23	Prov. Oost-Vlaanderen	77,67	24,86
UKJ4	Kent	75,11	10,48
UKH2	Bedfordshire, Hertfordshire	74,10	13,31
NL23	Flevoland	73,91	5,53
NL31	Utrecht	72,85	17,01
NL22	Gelderland	72,72	9,21
UKE3	South Yorkshire	71,56	20,96
DEA1	Duesseldorf	70,24	23,74
PL612	Torunsko-wloclawski	69,36	1,83
UKJ1	Berkshire, Bucks and Oxfordshire	68,05	10,27

Figure 6: NUTSX regions in the EU-27 with an above average share pf urban, peri-urban and rural areas



Urban
Urban
other

Peri-Urban
Peri-Urban
other

Rural
Rural
other

Scoure: ZALF, AIT

regions within Europe. All EU-wide databases and indicators used in PLUREL have been calculated on NUTSX, based on available NUTS2 or NUTS 3 data.

The totals for artificial surfaces, areas, population and densities in each of the area types of urban, peri-urban and rural are shown in table 2.

Higher level: Comparitive analysis across the EU-27

Each rural-urban region contains a certain mix of urban, peri-urban and rural land uses within its borders. So we identified those rural-urban regions with an above average share of urban, peri-urban or rural areas. These were labelled "predominantly urban", "predominantly peri-urban" respectively "predominantly rural" (figure 6).

Another issue is that most statistical data are available at NUTS2 or, to a lesser extent, NUTS3 scale, but not as data which are spatially explicit to a 1km² grid. So in order to combine settlement density data with statistical data, we classified as "predominantly peri-urban" those rural-urban regions which have a share of built up area classed as "peri-urban" that lies above the EU-27 average (median) of 6.5% artificial surface within peri-urban areas. Several maps in the following sections depict results for "peri-urban" regions, which are those highlighted in figure 6. (Note that according to this definition, some regions are "predominantly urban" and "predominantly peri-urban" at the same time).

Where are the hot spots of peri-urbanisation in Europe?

This method allows us to identify the 'hot spot' regions where peri-urban land uses and densities are the most widespread in Europe. Figure 5 shows the hot spots classified by the proportion of peri-urban built development, i.e. 'artificial surface'. These are mainly concentrated in the central 'Pentagon area' between London, Paris, Milan, Munich and Hamburg.

Table 3 presents a ranking of the 'Top 20' regions of the EU-27 based on the highest shares of artificial surfaces within each rural-urban region as determined by NUTSX borders. It may not be surprising that regions in the Netherlands, Belgium and south east UK are among the top places, but also that many regions in Poland and Italy are faced with the serious problem of peri-urbanisation However, note that this listing is dependent on the boundaries selected. For example, the Spanish Mediterranean coast faces severe problems of urban expansion and sprawl. But this is concentrated on a narrow strip, while most of the surrounding region is more rural and remote.

The dynamics of the peri-urban: Global change and regional response

The peri-urban may be the dominant urban design and planning challenge of the 21st century. It is not only an in-between fringe, but a new and rapidly growing multifunctional territory, often with globalised industries, high mobility and transport dependence, fragmented communities and degraded landscapes. In this chapter, we look at the dynamics of growth and change, a range of alternative scenarios for the future and the respective results of the PLUREL scenario modelling.

The global urban agenda

In some parts of the world, the peri-urban is a location for affluence and conspicuous consumption. In others, it is a fragmented zone of poverty and displacement – a kind of front line between the problems of the city and the countryside. Underlying this is the changing nature of the city and urban expansion itself. Along with the physical growth of urban form, there is a wider economic, social and cultural dynamic of change via the 'global urban system'. Looking beyond the conventional divide between 'urban' and 'rural', the 'peri-urban' is the central feature, and this can be both a local, regional and global space. Some see a new kind of 'edge city' (Garreau, 1991), and new kinds of metropolitan landscapes or 'metroscapes' (Greater Helsinki Vision, 2007; Kraffczyk, 2004).

Behind the European peri-urban agenda lies the greater global challenge of urbanisation. At present, 3.3 billion people live in urban centres across the globe. By 2030, this number is projected to reach five billion, with 95 percent of this growth in developing countries (UN Population Fund, 2007). While megacities tend to dominate the development policy agenda, their overall growth may slow down, while smaller cities of less than 500,000 will contain most new urban residents. On current projections, the majority of these will live in slums (Davis, 2005). As such cities modernise their transport networks and extend their zone of influence, they will merge into larger agglomerations with extended peri-urban areas and be organised around interchanges, airports, low density parks and campuses for business, research, shopping and leisure. The effect is a current global rate of doubling of urban built development (counted here as 'artificial surfaces') every 15-20 years (Angel et al., 2005).

There is an implication for the European agenda and the PLUREL research, namely that urban areas around the world are now aiming for growth and modernisation – in many cases faster than in Europe. If Europe can demonstrate practical ways of managing growth, avoiding urban sprawl, and encouraging more sustainable urban development, this can then transfer to other parts of the world, with benefits on a global scale.

Dynamics and driving forces

To explore the dynamics of peri-urban change and peri-urbanisation, we have to work at more than one level of scale and complexity. This is not only an academic question, but a practical question for policy makers who need to understand the peri-urban in order to work with it. The PLUREL research produced a five-level framework that helps to explore not only the direct and tangible forces of urban expansion, but also its underlying and system-wide effects (Ravetz et al., 2011) (figure 7):

- The first level describes urban expansion as a direct result of population growth, economic growth and the demand for physical space. This is detailed below;
- As cities expand further, they form regional agglomerations with step changes in economies of scale;
- Global dynamics of power and ideology then shape this new peri-urban territory;
- The whole rural-urban region goes through system-wide transitions, with radical restructuring and resilience effects;
- A final level concerns policy responses, which feed back into the mix, and become 'dynamics' themselves.

Direct urban expansion

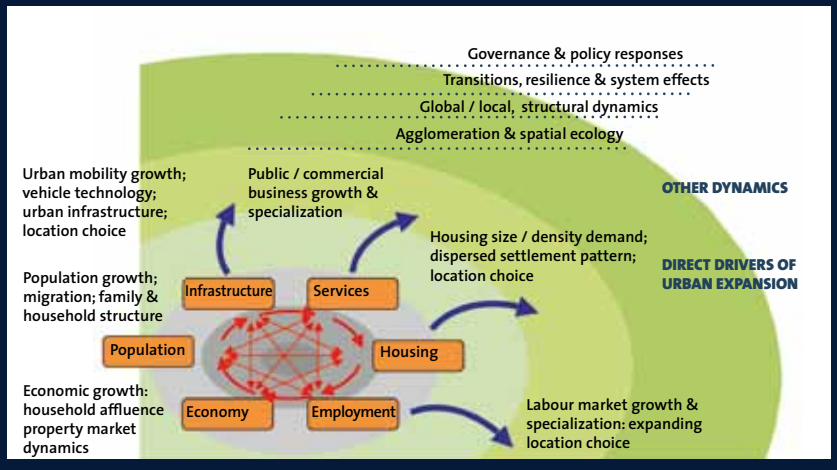
The first dynamic of urban expansion is population growth, with related factors being demographic and social change:

- Fertility and mortality rates. While these are relatively slow to change, over several decades there may be very different demographic profiles;
- International and interregional migration is more volatile, and depending on social policy and economic swings, can change rapidly;
- Urban-rural in/out-migration is dependent on spatial policy, the state of the cities or rural areas, as well as transport and communications;
- Lifestyle perceptions of city or rural quality of life, leisure and tourism, also affect the trends of peri-urbanisation.

Secondly, economic growth and development drives the rate of urbanisation. The level of savings and credit, and the overall rate of capital investment, leads directly to the expansion of the building stock and land use conversion:

- Employment pressures. In more remote areas, there is migration from rural to urban areas by those in search of jobs. In more central areas,

Figure 7: Driving forces & dynamics of peri-urbanisation
showing direct driving forces in urban expansion, within a 5-level dynamic framework. Based on Ravetz, Fertner & Nielsen (2011)



larger and more specialised labour markets are enabled by peri-urban development and road-based mobility;
- Employment and occupation patterns also affect the trends of peri-urbanisation. For example, the spread of teleworking in the service industries can encourage out-migration to peri-urban or rural areas;
- Business technology will affect not only employment, but also supply chain logistics, as well as the distribution of production, services and consumption;
- Peri-urban development is shaped by the property market. High value housing will tend to be located in high quality environments and segregated from other social groups. Meanwhile, there emerges many peri-urban social housing estates with multiple problems.

Environmental dynamics are varied, but it seems that climate change effects will dominate peri-urban development for the foreseeable future:

- Climate change impacts include sea-level rise and fluvial flooding, extreme storms and heat waves, soil erosion and habitat change;
- As a result of climate change, urban environments are likely to become more unpleasant and hazardous, which then encourages further out-migration to more liveable peri-urban areas;
- Water resource issues will meanwhile put pressure on peri-urban development, particularly in arid climates and/or areas vulnerable to flooding;
- Renewable energy sources such as biomass are often sited in peri-urban areas, and may start to influence the pattern of development;
- Urban infrastructure such as waste and sewage treatment is usually in peri-urban locations. However, new concepts in recycling and 'zero-waste' may change this.

The urban development regime, housing markets and investment cycles, housing design and layout are all linked to the growth and pattern of peri-urban development:

- Transport and communications are central to the peri-urban agenda. Access to networks or infrastructure can enable and encourage in/out-migration, counter-urbanisation, or re-urbanisation;
- Spatial planning policy may aim to manage or contain growth in larger cities, smaller cities and towns, or smaller rural settlements, or allow a free market;
- Behind formal spatial planning policy is a less visible 'regime effect' from the system of property rights, land markets, patrimony and inheritance.

Rural development and landscape quality have traditionally been on the receiving end of urban expansion. This may be changing however, with environmental effects on property values, new rural economies and new urban systems for food and other resources. The dynamics of change are therefore complex:

- Agriculture, particularly driven by the CAP reforms relating to intensive or extensive production, is a major influence on land use change;
- Biodiversity and habitat protection is a direct policy choice that may aim to take parts of the peri-urban area out of urban development;
- Rural economic development trends are also very sensitive to growth pressures and policy agendas, as detailed in the next section.

Agglomeration effects

The urban expansion scheme outlined above is not a one-way process: it also generates responses and changes in the surrounding areas that start to amount to a **'regional agglomeration'** effect. This is where the focus of attention shifts from a free-standing city in rural surroundings towards the wider community of interconnected and multilayered settlement forms. The result is that, for the majority of residents, previously separate peri-urban areas develop into continuously functional, but low density, cities for most forms of living, working and shopping. The process is described by Soja (2000): restructuring of the urban economic base; formation of a global urban system; restructuring of urban form and land use; restructuring of the urban social pattern; formation of the 'carceral' city and an 'archipelago' of enclaves; and finally, new types of urban images and cultures that are powerful dynamics in their own right.

In practical terms, there are strong incentives for peri-urban locations for retail markets, labour markets or logistics hubs. A firm looking for a large new site will often prefer a peri-urban location which is accessible (generally by road) and serves a larger population from several urban areas.

Soil sealing is expected to increase nearly four times faster in peri-urban areas than in urban areas

Structural dynamics and transitions

One way to explore the underlying dynamics of power and ideology is through 'critical perspectives' (Roberts et al., 2009). They are critical in the sense that existing structures of power, wealth and ideology are not assumed as inevitable and fixed. One perspective starts with ***globalisation*** and the economic effects on the structure of business and finance, political effects of which social groups are in favour, and cultural effects through media and ICT ('information and communications technology'). A counterpart force can be seen as ***'localisation'***, where the cultural identities of local people and places can emerge and be reconstructed in new ways. Many peri-urban areas are stark demonstrations of this. There is a ***liberalisation*** agenda, re-shaping the state-market balance, which involves privatisation, franchising, and cost recovery, with powerful effects on urban governance and public services. Meanwhile the ***consumption*** culture is a driver of cultural identity, with new perceptions of peri-urban environments through leisure, tourism and locational decisions. These combine in many ways. For instance, in the 'post-metropolis' concept of Edward Soja (2000), the 'space of flows' from Manuel Castells (1996), the 'risk society' concept of Ulrich Beck (1995) and the 'cosmopolis' of Leonie Sandercock (2003).

A structural approach looks beyond the physical land use processes at the underlying dynamics of power, wealth and ideology. Here we can see the peri-urban as a relationship of dependency and colonisation, and as a new kind of urban hinterland and service zone. There is also a powerful discourse on the peri-urban as a kind of frontier for enterprise that is shared by the science park developers and financiers, with images of green field sites, fast airport connections, and generally a 'cultural-cognitive-capitalist' creative zone (Scott, 2000). There is also a peri-urban of resistance, which is the home of illegitimate, informal, grey or black economies – farmers who deal in scrap lorries or youths looking for a festival location (Shoard, 1983).

All this raises very topical questions for this report – for whom or what is the peri-urban landscape? Who should decide, and who receives the costs or benefits?

Large parts of the peri-urban area are no longer competitive in agricultural use, and there are many other possibilities which require a policy decision, such as nature conservation, housing, infrastructure, enterprise or new forms of cultivation for urban food or energy (Ravetz, 2011). Increasingly, peri-urban areas are privately owned by 'high net worth' individuals, even while there are increasing pressures for public access. Overall, there are many agendas – economic, ecological, historical, residential and functional – which can be in competition or conflict.

Transition thinking draws on current ecological theory on 'complex adaptive systems' that are composed of multiple relationships at multiple scales (Waltner-Toews, 2009). The implication for policy is crucial – that to manage a complex adaptive system

Ecosystem Services: water household and habitat function in the peri-urban area. Haaglanden, the Netherlands

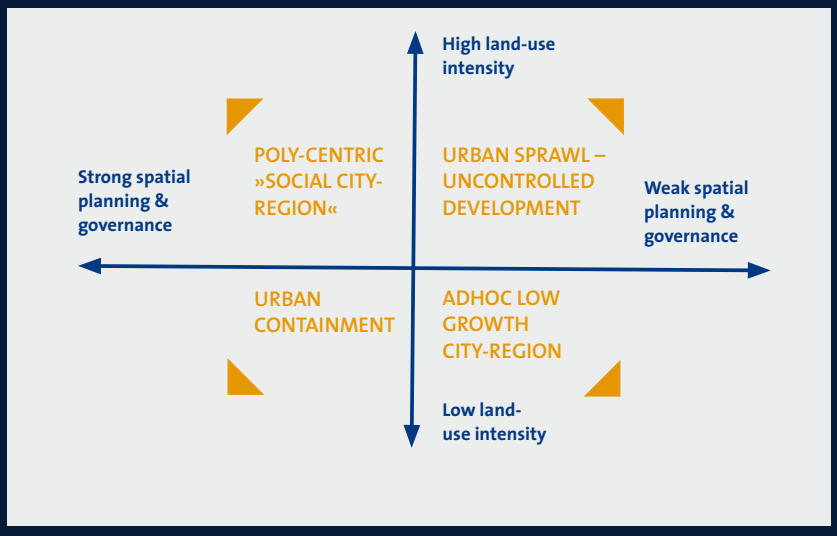


Figure 8:
Peri-urban paradigms – quantity vs. quality

Coexistence: Alternative trailer commune next to town house. Berlin, Germany, 2010

is a different task to managing linear systems, and that governance itself needs to evolve along with its territory. However, there is also a 'de-territorialisation' effect, where the urban social-economic order is 'splintering' into globalised networks and disconnected from the local (Graham and Marvin, 2001). This is seen clearly in some peri-urban areas that lack the traditional patterns of settlement hubs and meeting points, and instead form a diffused network of 'spaces of flows' with 'landscapes of power' that are shaped by global images and consumption aspirations (Zukin, 1998).

Governance and policy responses

The final level in this framework looks at governance, spatial planning and the policy system itself. This is both a response to problems, and also a dynamic in itself. For instance, the Green Belt policy in the UK is at least partly successful in its objective of urban containment, but it then shapes the land and property market and generates other problems such as dis-investment and land hoarding, which are then the objective of further policies, and so on.

Firstly, there are questions on the overall scope and effects of 'spatial governance' – the system of territorial government, spatial planning and the policy system (figure 8). The portion on the left shows the main factors in direct urban expansion, with alternative modes of spatial governance:

- **High or low land use intensity**, e.g. the amount of area demanded for each unit of housing or business. This factor could be further analysed in terms of economic intensity, value or production, or social intensity in terms of welfare measures. Environmental land use intensity is also relevant, where the urban system demands land for ecosystem services, material supplies, waste management, leisure and amenity. The land use intensities are normally assumed as on a growth trajectory that is similar to that of economic GDP. In the scenario modelling (next section), land use intensity is assumed to be correlated with economic growth and capital investment;
- **Strong or weak spatial governance**. This ranges from active and coordinated spatial planning and governance in the public interest to ad hoc and fragmented governance for short term enterprise and private profit.

The many issues in governance and spatial planning are covered in later chapters. Here, the point is that these can be dynamics in their own right. This is clear, with the overall policy agenda to redirect the process of urban development and 'peri-urbanisation' away from sprawl towards polycentric development in a 'social city region' (Howard, 1898; Ravetz, 2000). This involves looking at both quantity (land use intensity) and quality (coordination of land use patterns), not only in the peri-urban, but across the whole rural-urban region.

Scenarios and modelling

Figure 9: PLUREL Scenario framework

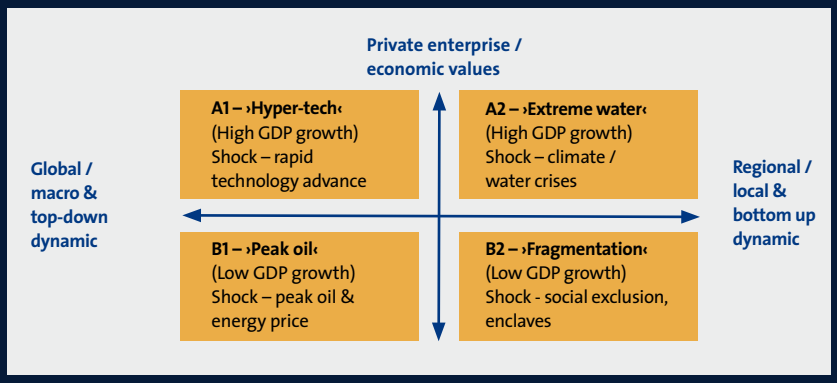
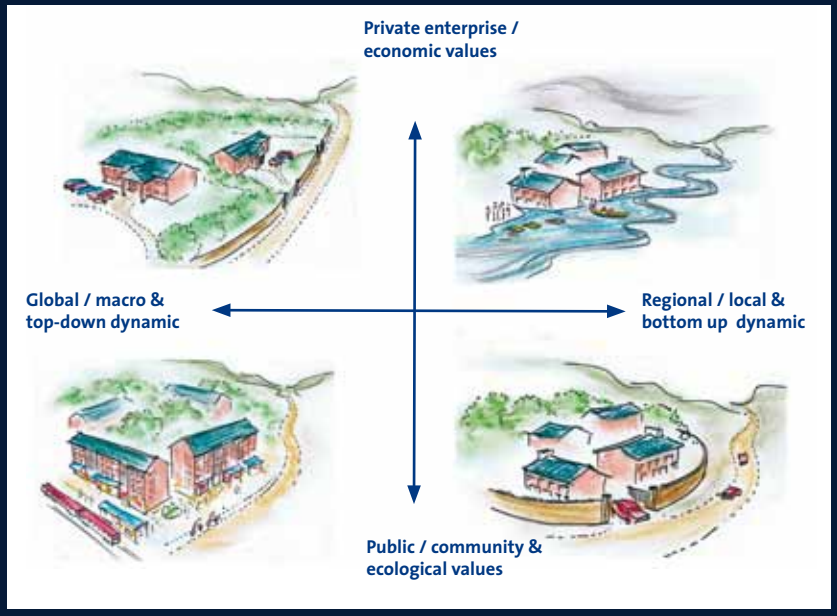


Figure 10: PLUREL Scenario images



Scenario method and framework

The dynamics of peri-urbanisation, as outlined above, are complex, multilevel and beyond the capacity of any single technical modelling system. So it is essential to work with scenarios. These can combine technical analysis and modelling with other non-technical kinds of social, cultural and political changes. Such scenarios are most effective when they include a creative set of stories, models, images and visions. PLUREL developed a scenario framework, based on the IPCC (Inter-governmental Panel for the Scientific Assessment of Climate Change) report 'SRES' (Special Report on Emissions Scenarios) (IPCC, 2001). This framework included:

- Applying the global level scenarios to the European level up to the years 2025 and 2050;
- Developing and exploring a series of plausible 'shocks', i.e. rapid and important changes that bring current trends into sharp focus;
- Particular focus on the implications for urbanisation, peri-urbanisation, and peri-urban land use change.

The scenario framework includes four main types (with references to the A/B/1/2 of the IPCC report) (figures 9 and 10):

Flooding of Elbe river near Hitzacker, Germany, 2002

A1 – high growth scenario ('Hypertech')

... a future world of rapid economic growth, global population that peaks mid-century, and the rapid spread of more efficient technologies. Investment in research and development is high, and nations share knowledge and pool resources in a global market place. Energy prices decline as supply is driven by new renewable and nuclear energy sources. The 'shock' concerns the rapid acceleration of ICT, which transforms home and work. The effect on the peri-urban is to accelerate out-migration and counter-urbanisation, so that large areas become 'peri-urban/peri-rural'. These see extended networks of settlements, serving affluent knowledge workers in flexible employment with digital connections to the global urban system.

A2 – climate change scenario ('Extreme water')

... a more heterogeneous world of self-reliance and local identity. While the population increases, economic development is regionally-oriented: economic growth and technological change are slow and fragmented. The 'shock' here is subtitled 'Extreme water', and this sees the rapid onset of climate change effects – flooding, drought, storm and a sea-level increase. The effect in the typical peri-urban area is constrained development, uneven growth and un-coordinated sprawl without the affluence to compensate.

B1 – energy crisis scenario ('Peak oil')

... a future of environmental and social awareness – a global approach to sustainable development, involving governments, businesses and households. Economic development is more balanced, with investment in resource efficiency, social equity and environmental protection. Population levels are relatively stable. The 'shock' in this scenario is driven by the early arrival of 'Peak oil', i.e. a decline in global oil production and rapid rises in energy prices, with many social and economic effects. The peri-urban agenda here is dominated by the rising costs of car-based settlement patterns. There is a return to cities and consolidation of rural towns. Many peri-urban areas are depopulated and returned to low-energy farming.

B2 – social fragmentation scenario ('Walls and enclaves')

... Europe sees a fragmentation of society in terms of age, ethnicity and international distrust. The elderly are increasingly dependent on the younger generation, migrant workers undercut each other, and there are intergenerational and interethnic conflicts. The 'shock' then accelerates this process of fragmentation and segregation of different communities. Cities become more dispersed as younger migrants dominate city centres, and older natives populate the outskirts and enclaves outside the cities so that the peri-urban becomes more like 'peri-society'.

These scenarios were used at the EU level to model the effects on land use of economic growth and development combined with demographic change. Details of the modelling method are described in the Annex. The scenarios were also used in regional case studies together with stakeholder input on social and cultural trends, as well as their implications for governance.

European-wide scenario projections

There is a gap between population growth and the growth of artificial surface within Europe. In the post-war period, European cities have grown between 40% and 300% in size but considerably less in population (EEA, 2006). According to all four scenarios, this gap will grow further in the coming years, meaning increasing per capita land consumption.

Besides this, the scenarios show some differences in possible future development. Economic development is 50% higher in the scenario A1 than in B2. Similar growth rates are seen with the increase of artificial surface within Europe. On the other hand, population development is similar in all scenarios, changing only by a very low annual increase (figure 11). As in the previous chapter, the PLUREL method analysed the whole EU territory by urban, peri-urban and rural area types. Table 5 illustrates the key results of the typology and scenario modelling exercise.

All four scenarios show a continued growth of built development, i.e. 'artificial surface', across Europe (Figure 12). Peri-urban areas will experience the highest growth rates of up to 2.46% per year, while growth in rural areas will be nearly as rapid in the A1 – Hypertech scenario. In contrast, areas which are already predominantly urban will experience relatively small changes, indicating that these areas are relatively 'full up'. The projected population growth is much more gradual at a maximum of 0.18% in the peri-urban areas. However, there is much variation across Europe, as illustrated in the figures 13 and 14. There are large contrasts projected between the central areas of the 'Pentagon', the Mediterranean coast and central eastern Europe. Higher growth is predicted for some of the more remote areas in northern and western Europe, but from a baseline that is sparsely populated and developed. Meanwhile, some more remote areas in eastern Europe may continue to depopulate.

Figure 11: Comparison of scenario average for population, GDP and built development

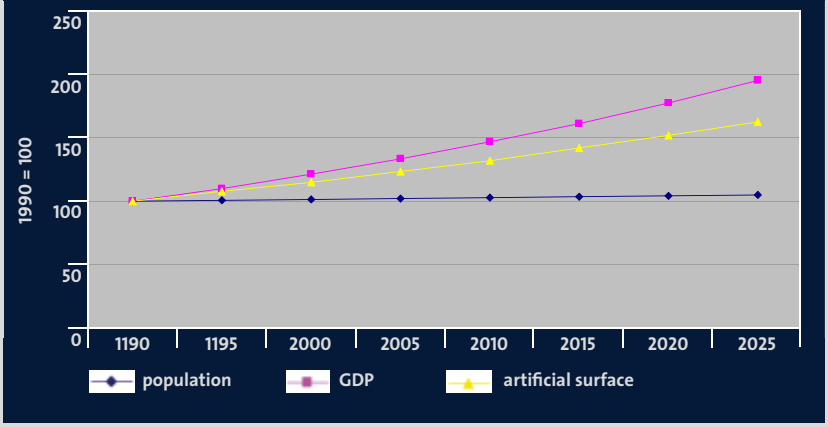


Table 4: Annual growth rates 1990-2000 and scenario projections

	Projected annual increase by scenario in %			
	A1	A2	B1	B2
Population *	0.16	0.14	0.13	0.15
GDP/capita **	2.22	1.92	1.53	1.43
Artificial surface ***	1.86	1.55	1.10	1.09

* 2000-2025, EU -27 without Bulgaria: Source AIT
** Data for 2005-2025. Prices 2000. Bulgaria not included in scenario data
*** Data for 2000-2025

Table 5: Projected growth of artificial surface in urban, peri-urban and rural areas

Sub-region	Artificial surface area in 2000 (with share of total area)	Annual increase until 2025 by scenario A1	A2	B1	B2
Urban	48,765 km^2 (79.1 %)	0.65%	0.61%	0.50%	0.48%
Peri-Urban	47,532 km^2 (8.3 %)	2.46%	2.06%	1.44%	1.44%
Rural	72,182 km^2 (2.5 %)	2.13%	1.75%	1.24%	1.24%
Total	168,478 km^2 (4.7 %)	1.86%	1.55%	1.10%	1.09%

Table 6: Projected growth of population in urban, peri-urban and rural areas

Sub-region	Resident population in 2000 (millions) (with share of total)	Annual increase until 2025 by scenario A1	A2	B1	B2
Urban	234.85 (50.1%)	0,17%	0,15%	0,12%	0,17%
Peri-Urban	117.95 (25.1%)	0,18%	0,15%	0,13%	0,16%
Rural	116.67 (24.9%)	0,11%	0,08%	0,14%	0,10%
Total	469.47	0.16%	0.14%	0.13%	0.15%

Souce: (Tables 4-6, figures 11, 12): IIASA, ERASME, University of Edinburgh, Austrian Institute of Technology

Figure 12: Artificial surface growth – A1 scenario

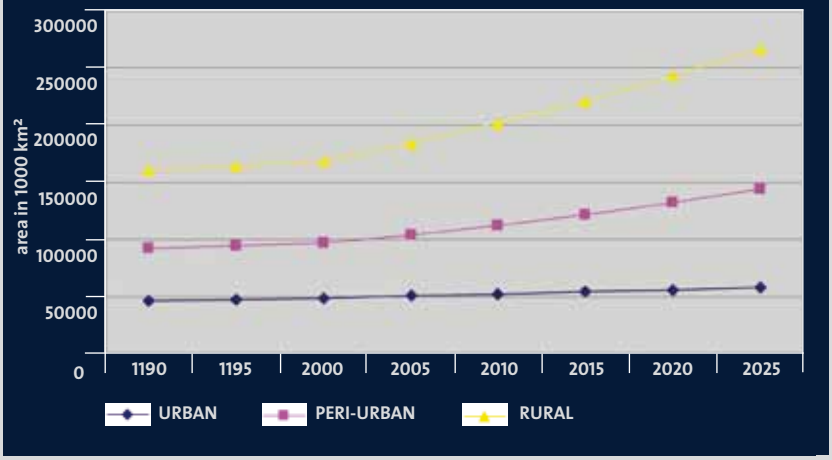


Figure 13: Changes in proportion of artificial surface

A1 – 'hyper-tech': growth, technology innovation, and out-migration to rural areas

A2 – 'extreme water': rapid climate change, and defence against ood and drought

Scenario A1
2000 – 2025

Difference to baseline in %

- 0 – 1o
- ▸ 10 – 20
- ▸ 20 – 30
- ▸ 30 – 40
- ▸ 40 – 50
- ▸ 50
- no data

Scenario A2
2000 – 2025

Difference to baseline in %

- 0 – 1o
- ▸ 10 – 20
- ▸ 20 – 30
- ▸ 30 – 40
- ▸ 40 – 50
- ▸ 50
- no data

B1 – 'peak oil': energy price shock, with re-population of cities and towns

B2 – 'fragmentation': communities in retreat into private enclaves

Scenario B1
2000 – 2025

Difference to baseline in %

- 0 – 1o
- ▸ 10 – 20
- ▸ 20 – 30
- ▸ 30 – 40
- ▸ 40 – 50
- ▸ 50
- no data

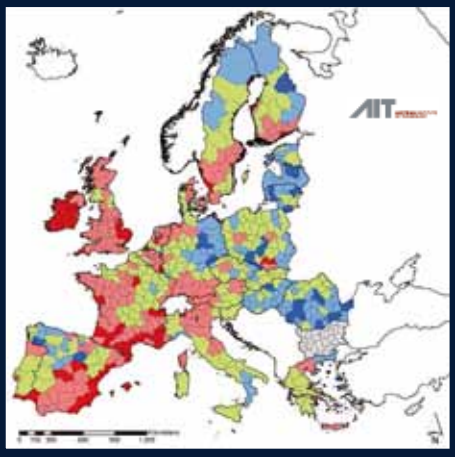
Scenario B1
2000 – 2025

Difference to baseline in %

- 0 – 1o
- ▸ 10 – 20
- ▸ 20 – 30
- ▸ 30 – 40
- ▸ 40 – 50
- ▸ 50
- no data

Souce: University of Edinburgh, Austrian Institute of Technology

Figure 14: Changes in total NUTSX Population

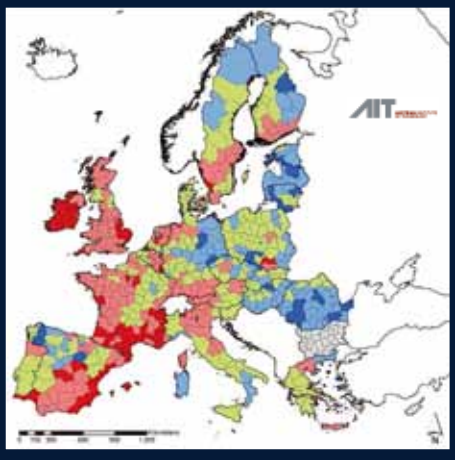


Scenario A1
2000 – 2025
Difference to
baseline in %

◄ = -20
► -20 – -5
► -5 – 5
► 6 – 20
► 20 – 66
no data

Scenario A2
2000 – 2025
Difference to
baseline in %

◄ = -20
► -20 – -5
► -5 – 5
► 6 – 20
► 20
no data



Scenario B1
2000 – 2025
Difference to
baseline in %

◄ = -20
► -20 – -5
► -5 – 5
► 6 – 20
► 20
no data

Scenario B2
2000 – 2025
Difference to
baseline in %

◄ = -20
► -20 – -5
► -5 – 5
► 6 – 20
► 20 – 64
no data

The second set of model results, depicted above in Figure 14, shows the projected population development.

- In scenario A1, the strongest growth combination (population/artificial surfaces) is almost continuous from Portugal to Sweden. However, parts of eastern Europe are still experiencing depopulation and shrinkage.
- Scenario A2 shows a more mixed picture, but there is still combined growth over most of the Mediterranean region.
- In scenario B1 and B2, by contrast, the areas of shrinkage and low growth extend right across the core regions. Even in affluent countries such as France, the UK and Germany, there are large areas where urbanisation will slow.

Overall, the scenario modelling shows some significant results:

- Population growth rate. Most scenarios show a strong contrast between growth in the western regions and the Mediterranean sunbelt, and continuing decline in central and eastern Europe;
- GDP growth rate. Most scenarios show very strong growth in eastern and south east Europe, and some in the more remote regions of Spain, Ireland and northern Sweden. In the B1 and B2 scenarios, most of the core regions show less than 2% growth (except for Benelux).
- Artificial surfaces. Scenario A1 shows the extreme case where most of the core regions show over 10% growth in surfaces by 2025. By contrast, the scenario B2 shows a development retreat back to the main city and capital regions in most countries.

Conclusions

This is a brief review of the peri-urban dynamics and driving forces, the scope of scenarios, and the results of the PLUREL modelling on population and built development. There are many drivers of change in a complex situation. Some of the more direct drivers have been modelled up to 2025 using a scenario framework based on that of the IPCC. The headline results from the pan-European scenario modelling are shown here, in summary:

- The A1 high growth 'Hypertech' scenario brings the highest increase in artificial surfaces, which equates to the most rapid peri-urbanisation;
- Growth under all scenarios is highest in regions which are already peri-urban (i.e. above average shares of peri-urban land). Many of the hot spots lie within the European 'Pentagon' or core region (between London, Hamburg, Munich, Milan and Paris).
- However, growth is also spread over many other mainly urban and rural type regions. There is still a problem of depopulation and shrinkage in most scenarios for some central and eastern areas.
- Overall, the direction of current economic and social policy, as in the EU2020 strategy and Lisbon accords, aims towards a development path which is likely to increase artificial surfaces in peri-urban areas by 1.4% – 2.5% p.a. If this continues beyond 2025, such areas could double in size between 2035 and 2055.

The following sections look in more detail at the implications of this regarding policy in different sectors.

Low density housing in the peri-urban. Dublin County, Ireland

PLUREL

PERI-URBAN AGENDAS

Economy and employment

The expansion of peri-urban areas in Europe is a manifestation of a complex web of social, economic and technological changes. It reflects the drive towards lower density and lower costs locations, as well as the search for better environmental quality.

The situation

The contemporary processes of metropolisation, deindustrialisation and demographic change have a profound and mutually reinforcing impact upon the structure of land use and the relations between urban, peri-urban and rural areas in Europe. The analyses of interrelations between economic development and land use characteristics, carried out at the NUTS-3 level, point towards spatial polarisation trends. It is found, among other things, that the income gap between urban and peri-urban areas on the one hand, and rural areas on the other, has been widening. This is revealed by the analysis of interrelations between GDP per capita change, as observed during the 1996 – 2006 period, and the intensity of land used for human settlement, which is measured by the share of artificial surface in the total land area.

Although spatial polarisation has to be considered as an important trend, it is by far not the dominant one. In fact, in many respects, the large metropolitan areas across the European Union tend to display increasingly similar land use and economic development characteristics. These regions are characterised by relatively small variations of composite indicators in which measures of economic development and land use structure are integrated. Conversely, the biggest variations in this respect are observed among the rural regions. Nevertheless, the polarisation of non-urban space in Europe is first of all expressed by growing disparities between rural and peri-urban zones surrounding the large urban centres on the one hand, and peripheral rural regions on the other. This is illustrated by the distribution of the values of GDP potential per capita, with the pronounced peaks in the core – the heavily urbanised west central part of the EU (figure 15).

Peri-urban zones are generally characterised by rapid economic change. These areas benefit from the deconcentration of economic activity at a local scale, i.e. the relocation of firms and the related jobs from urban centres. At the same time, they attract labour and other resources from smaller towns and

Economic development: construction of a 100 million Euro motorway-based logistic centre

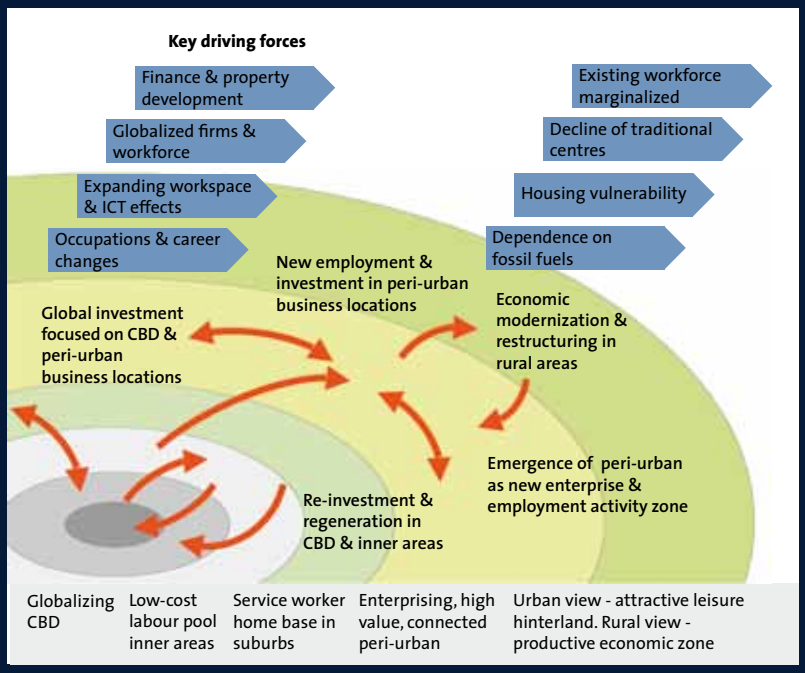
the predominantly rural regions. Increasingly, the peri-urban areas are becoming loci for metropolitan functions, including knowledge-intensive industrial and advanced service sector activities.

Conversely, the peripheral rural regions continue to experience selective population outflow and general depopulation. Their economic base faces instabilities related, among other things, to decreasing embeddedness of manufacturing activities that tend to move in search of lower cost locations. These regions often lack sufficiently skilled labour, and are characterised by poor spatial accessibility that constitute barriers to the spatial diffusion of economic growth. This causes spread effects originating from large and economically sound urban centres. As a result, they tend to suffer from the out-migration of young and educated people, the departure of innovative firms and the transfer of locally accumulated savings to the large centres. A special category of such predominantly rural, economically less developed regions are borderland areas, espe-

Figure 15:
GDP/ capita potential 2000

Source: PAS, EUROSTAT

Figure 16: Economic & employment dynamics in the peri-urban



Source: UOM

cially those situated along the European Union's eastern borders. Low overall population density, dispersed and functionally disintegrated settlement networks in these areas are among the factors responsible for an insufficient level of investment activity and a limited degree of participation in physical modernisation and economic development processes.

Nevertheless, the peripheral rural regions benefit from a number of unique assets related to the natural environment and cultural heritage, the potential of which is only partly utilised. At the same time, these assets may in certain instances hinder economic expansion by restricting the scale and scope of infrastructural investments (figure 16).

The future

The future evolution of land use and its economic aspects in European rural-urban regions is a function of general development trends that can, to a certain degree, be corrected or modified by public policy. Various combinations of possible trends, of the impact of new external factors (such as climate change) and policies, give rise to alternative development scenarios. Policies that influence territorial development patterns are both of explicitly spatial as well as sectoral character. An important role is also played by mid- and long term corporate policies, especially in such territory-relevant fields like the energy sector.

The interdependence between economic and land use change has been projected into the future

Figure 17:
GDP/ capita potential
Scenario A1, 2025

Quotients (EUR per capita)
- no data
- 7658
- 13078
- 19393
- 28235
- 42238
- 59486
- 77389
- 92781
- 117878
- 153269
- 175127
- 211437
- 238162
- 490622

Scenario A2, 2025

Quotients (EUR per capita)
- no data
- 6922
- 11905
- 17785
- 25596
- 38585
- 46442
- 55009
- 70094
- 83855
- 108627
- 139243
- 166155
- 195466
- 454587

Source: PAS

according to four alternative development scenarios, as defined earlier in this document (Korcelli and Kozubek, 2010). This projection extends until 2025. As indicated above, the highly urbanised areas, those with a high share of artificial surface in the total land area, are generally characterised by relatively high gross domestic product (GDP) per capita values, as expressed in purchasing power parity (PPP) terms. This association continues throughout the projection period. However, the distribution of projected GDP values increases while becoming less distorted (figure 17). The share of spatial units characterised by values above the mean indicator value tends to increase. This suggests a growth of territorial cohesion levels in the future. Interestingly, differences between the four alternative scenarios are not pronounced in this respect. Similar results pertain to projected changes of employment and its sectoral composition.

Figure 18 shows the projected change in employment in the service sector within the time span 2000 – 2025 for the four scenarios. While in rather remote regions of Europe (eastern Scandinavia, Hungary, and certain regions in central and northern Spain) strong reductions will occur, working places in the service sector in other regions will boom, such as in all coastal regions, large parts of UK and nearly the complete area of Poland. As with GDP projections, employment projections also do not reveal distinct differences.

As the results of the scenario analysis indicate, the time span of 15 years until 2025 may not be a sufficiently long period to envision radical changes in territorial patterns in Europe at a macroscale. Major infrastructural projects that have a major impact in this respect, such as high-speed railway networks, require long planning and implementation periods. The past and current trends allow us to anticipate a gradual convergence of basic economic indicators at an international scale, and the persistence, if not an increase, of interregional economic disparities. At an intraregional scale, relations between urban, peri-urban and rural zones of rural-urban regions may evolve in alternative directions. As it is generally expected, the metropolisation process which is fuelled by globalisation will continue over the next few decades. However, the concentration of people and economic activity in metropolitan areas cannot last indefinitely. It is appropriate at this point to refer to the so-called counter-urbanisation phenomenon, which appeared rather unexpectedly and prevailed in western Europe and north America during the late 1970s and the early 1980s. This phenomenon was marked by a turnaround of earlier, long term migration, as well as regional economic development trends. What are the factors or circumstances under which a similar trend reversal could occur in the future, causing the growth of medium-sized and smaller towns situated at some distance from the metropolitan centres at the expense of major urban and peri-urban areas?

Four such factors can be identified here. The first one, which is rather conventional, refers to growing dysfunctions of large urban concentrations. At a certain point, spatial concentration of population and economic activity in metropolitan areas results in an increase of their functioning costs above

Scenario B1, 2025

Quotients (EUR per capita)
- no data
- 1595
- 25304
- 49013
- 72722
- 96431
- 120140
- 143849
- 167558
- 191267
- 214976
- 238685
- 262394
- 286103
- 309812

Scenario B2, 2025

Quotients (EUR per capita)
- no data
- 3518
- 27964
- 52410
- 76856
- 101302
- 125748
- 150194
- 174640
- 199086
- 223534
- 247978
- 272424
- 296870
- 321316

Typical conflict between grown structures and new development strategies. Konstantin Jeziora, Poland

the level of aggregate benefits. This critical level is sensitive to technological and environmental change (energy cost, climate etc.), as referred to in most of the general socioeconomic and spatial development scenarios. The second factor, also extensively called upon in scenario analyses, concerns growing social and spatial fragmentation of metropolitan space, as brought about, to a large extent, by the inflow of migrants from low-income countries, and the expansion of the so-called inner-metropolitan periphery that is composed of districts scoring low on the scale of both social and physical indicators. This process may again cause a shift in the balance of attractiveness in terms of both living conditions and the location of modern economic activities, in favour of medium-sized and smaller towns situated in lower population density regions at the cost of large urban and peri-urban areas.

The third factor pertains to the process of population change and its implications for spatial mobility, including migration propensities. The continuing population outflow, from rural areas and smaller towns to large urban areas, accelerates population ageing in the former areas, thus reducing their total out-migration potential. Conversely, the accumulation of relatively younger populations in large cities and peri-urban zones implies higher migration levels. One part of this migration flow is interurban as well as international, while another part is oriented towards smaller towns and rural areas. At some point in time, the volume of migration flow may become large enough to exceed the reverse stream.

The fourth condition under which a reversal, preceded be a slowdown of observed metropolisation trends might take place, refers to the future course of economic globalisation.

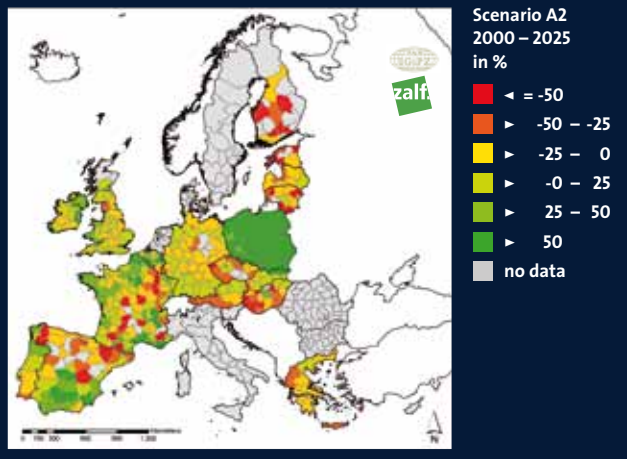
The process of delocalisation – the transfer of industrial production to low-cost countries – is gradually extended to the service sector, which includes technologically advanced and innovative activities. As a result of this, the present economic base of major European metropolitan areas may become severely affected. In the future, Europe's competitive position on the global scale may increasingly depend on her globally unique, cultural and historical heritage assets, the domain in which the network of medium-sized and small towns occupies a particular place.

The Konstantin-Jeziorna case in the Warsaw Metropolitan Region illustrates conflicts between the local authority, or the local community, and owners of an industrial plant – a paper products factory. The factory was built in the 18th century, and a part of it is under conservatory supervision owing to its historical and architectural values (see photos). This year, the present owners – a Finnish industrial conglomerate – decided to discontinue operations until 2012 and move production to a new location. This decision created major difficulties for the local authority, as the plant had provided a part of the town with electricity, heating and drinking water for many years, and its sewage treatment plant had collected sewage from the whole township. In the past, the local government was not interested in assum-

Figure 18:
Changes in the number of emloyees in the service* sector

* Wholesale and retail trade, repair service; hotels and restaurants; transport; storage and communication

Changes in the number of emloyees in the service* sector



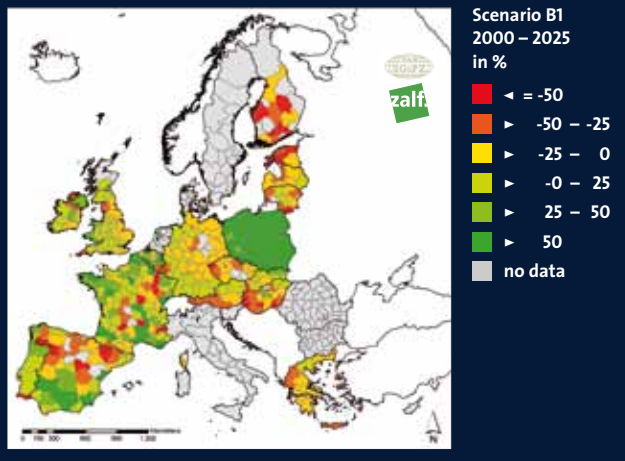
ing responsibility for the plant. Now it is no longer for sale. The township is presently facing the problem of finding an alternative solution with all the associated costs and delays involved.

Goals, objectives and policy challenges

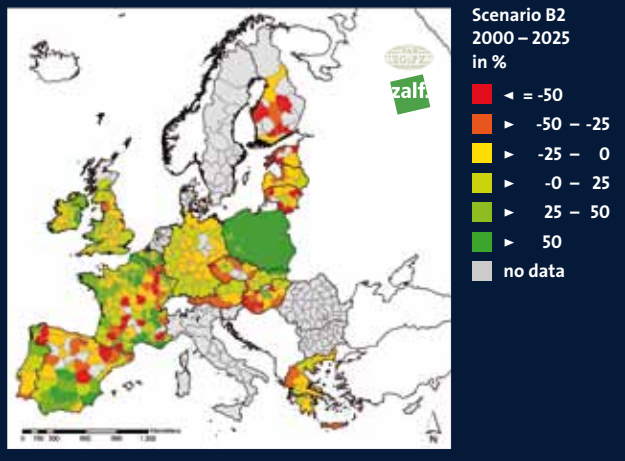
Policies that focus on relationships between economic development and land use are generally governed by the sustainability principle. This involves searching for a balance between territorial cohesion and economic competitiveness viewed from a long term perspective. Such a balance requires partnership relations to exist between urban, peri-urban and rural segments of the rural-urban regions – the kind of linkages which are expressed in flows that compensate for spatial concentration effects implied by the metropolisation processes. The more specific policy objectives pertaining to the less-urbanised, particularly peripheral areas, should include: improving connectivity with major urban centres; enhancing the functioning of public institutions in these areas by aiming to improve both quality and access to public services with education held in foremost regard; supporting the development of local specialisation based on endogenous resources; and preserving environmental quality. Another relevant policy objective in this context is physical revitalisation of smaller towns with an emphasis on their cultural and historical heritage assets. These globally unique assets may help to preserve the competitiveness of European space in the long term.

Nevertheless, the balance between cohesion and competitiveness-oriented policies may assume various forms in different parts, or sub-regions, of Europe. In the densely populated and heavily urbanised west European countries, the focus tends to be put on secondary growth poles – the utilisation of potentials available in smaller urban regions, and in areas facing economic restructuring problems, such as old industrial regions. In the new EU member countries of central and eastern Europe, strategic spatial policy articulates the need to upgrade the international standing – to elevate the ranking of the main urban regions, including the capital regions, by closing existing infrastructural gaps and promoting the development of an advanced, knowledge-based economy. In those countries with strongly polycentric urban systems, the formation of integrated city networks is seen as a means of creating spatial synergy effects, thus allowing for increased specialisation and the emergence of new, high order functions. For regions of predominantly rural character throughout the EU, with primary sector activities such as agriculture, forestry, renewable energy production all playing an important role, the advisable strategies should aim at strengthening the economic and cultural functions of local medium-size centres, including the policy that would help to resist economic marginalisation and progressive depopulation of these areas.

Changes in the number of emloyees in the service* sector



Changes in the number of emloyees in the service* sector



Population and migration

Continental migration flows and regional population movements affect peri-urban development. Social transition in terms of birth rates, ageing and household structure also contribute to peri-urban land use change, which creates environmental pressures and social fragmentation. Instruments to manage growth and control decline must concentrate on developing compact sub-centres in peri-urban areas by establishing strict zoning regulations against urban sprawl, and by restructuring urban low-rent areas.

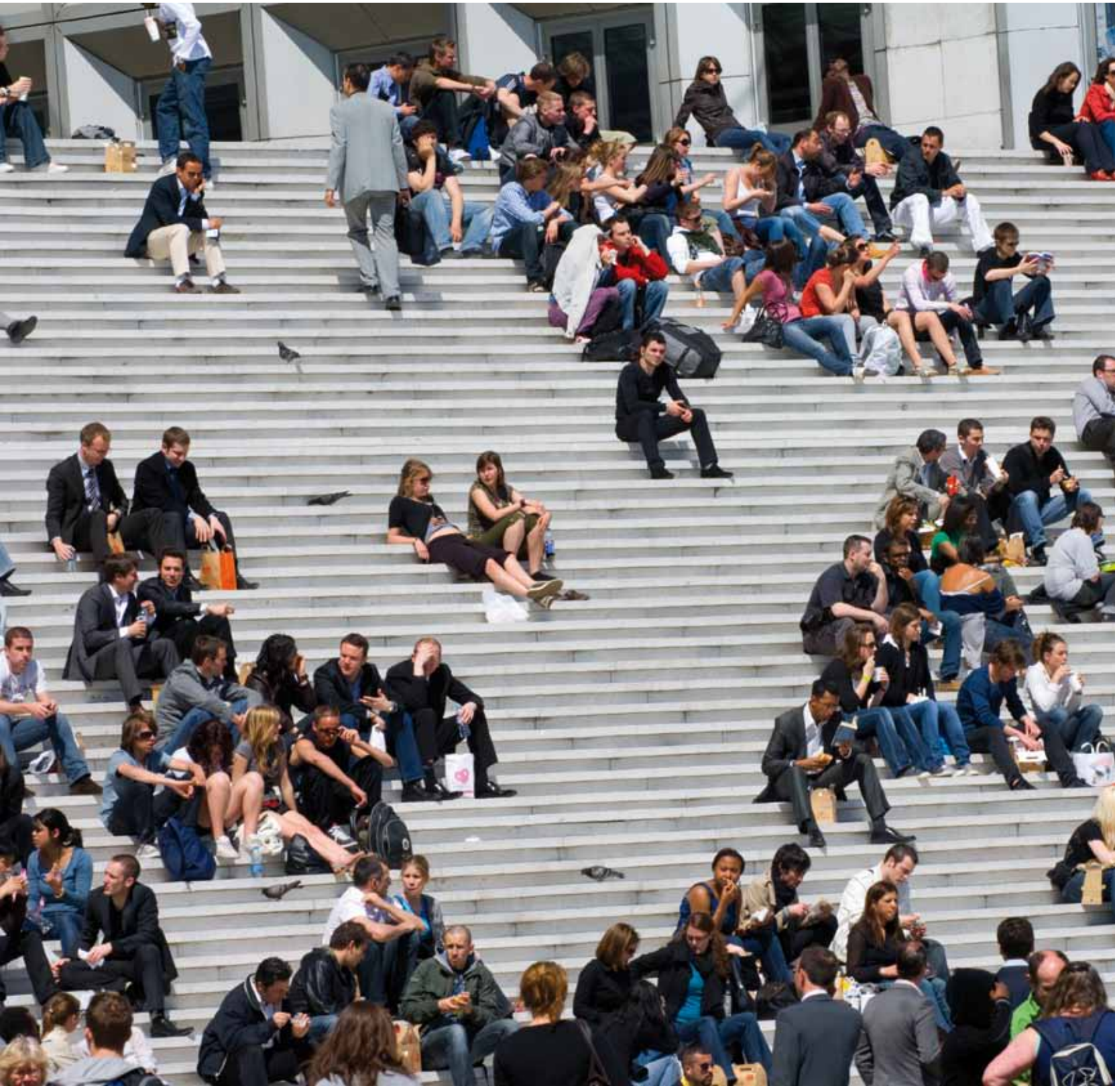
The situation

Social transitions appear as different but highly interrelated issues. Migration, education, employment and birth rates are all effects of changing lifestyles. Migration towards urban centres is driven by the desire for better education, better jobs and higher income, even though the urban environment might not be attractive to all. Higher independence and better education lead to higher female employment rates and women giving birth to fewer children. Self-determined lifestyles result in fewer marriages and more divorces, all leading to more one-person and single-parent households. Duel income families with a higher level of income demand better housing standards, which accelerates the movement towards attractive suburban and peri-urban areas. Longer life expectancy leads to an increase in the population segment comprising of elderly people who may also migrate to attractive places for their retirement.

Migration, ethnicity and their relationship to land use change

Europe is experiencing various migration flows that head towards wealthy countries away from the less rich ones (in and outside Europe). These flows also target economically active urban and peri-urban areas and attractive coastal areas, while moving away from rural areas. Migration can be of several types, including labour migration for work and better income, forced migration by refugees, and retirement migration. Thus migration and ethnicity can be seen to be related. Such migration flows, combined with short distance domestic rural-urban migration, cause population densification in urban (often low rent) areas and trigger further interregional migration flows that will be addressed later. We can see some clear patterns depicted in table 7.

**Societal diversity:
Stairs, La grande Arche,
La Defense. Paris, France**



CATEGORY	TYPE	MIGRATION CHARACTER	LAND USE CHANGE CHARACTER	LOCATIONS WHERE THIS CHANGE TAKES PLACE
1	Abandoned rural	Flow of young people to cities, flow of working age people to cities or abroad, older residents left behind	Land abandonment: fields lie uncultivated, empty farms, forest colonising abandoned land, landscape becoming progressively »wilder«.	Eastern Europe (Baltics away from main cities), parts of Poland, Bulgaria and Romania, Portugal and Spain, parts of Swiss, Austrian, Italian and Greek mountains.
2	Extensified rural	Flow of young people to cities, general depopulation out of the region.	Extensification of agriculture and forestry: more land farmed by fewer people, extensive modes of farming and industrial forestry. May be some tourism development in places.	Eastern Finland, Eastern Germany, parts of Romania, Italy, central Sweden, Hungary, eastern France, Iceland.
3	Stable rural	Slight increase in population but low rates of migration, mostly to urban centres within the area.	Traditional farming continues or there is extensification in remoter places and tourism development including holiday houses.	Western and northern Norway, northern Finland, rural Ireland.
4	Idyllic rural	Foreign migration into rural areas by well-off people from elsewhere in Europe or migration to remoter areas within countries. Retirement migration.	Rural houses and villages are regenerated and revitalised by foreign incomers. Traditional rural landscape is maintained or slightly extensified. Tourism development also uses old settlement infrastructure.	Western and central France, Central and northern Italy, parts of Portugal and Spain, small trend in Greece, Romania and Bulgaria, northern Scotland and parts of England and Wales.
5	Intensive rural	Labour migration into productive agricultural areas	Areas where agricultural production and horticulture is economic but relies on low wages. Landscape covered by polytunnels and other modern technology of agriculture.	Eastern England, Netherlands, southern Spain, Greece
6	Grey rural	International retirement migration from northern to southern Europe	Ex-urban suburban developments along coastal areas, in association with golf courses and other amenities.	Southern Spain, southern France and Brittany, the Algarve in Portugal, Greek islands.
7	Gentrified rural	Not strictly migration but movement of better-off people from the city to rural edge or hinterland	Villages close to large urban centres expand, new residential developments in rural areas within commuting distance of the city. Urbanisation of rural areas (more roads, street lights) and local people priced out of the housing market.	UK, Ireland, southern Germany, southern Scandinavia, France, national or regional capital cities in most countries or economically developing cities in Eastern Europe.
8	Dynamic urban	National migration from rural to city, EU labour and non-EU immigration, intensive in scale and multi-ethnic in composition in many places.	Pressure on urban areas leading to densification, reducing quality of some neighbourhood environments as well as urban sprawl. Ethnic composition of some urban districts changes, local population is displaced to the urban fringe.	Cities in UK, France, central Germany, Italy, Spain, Netherlands, Belgium, Scandinavia and other regionally dynamic areas
9	Stagnant urban	Moderate population change from inward and outward migration, net effect being slight reduction in population. Some non-EU immigration substitutes for the loss of national population.	Some decay of urban infrastructure, reduction in development pressures, increase in brownfield land.	Central Germany, parts of Eastern Europe, ex-industrial cities across Europe
10	Shrinking urban	Net out-migration from failing cities to other more economically active regions or countries. May be in-migration at a rate that does not balance out-migration	Reduction in development pressure, vacant housing in less-desirable areas, increase in brownfield sites.	Eastern Germany, Baltics, regional cities in eastern Europe.

Table 7: Characteristics of European-wide migration trends and related land use effects (Bell et al. 2010)

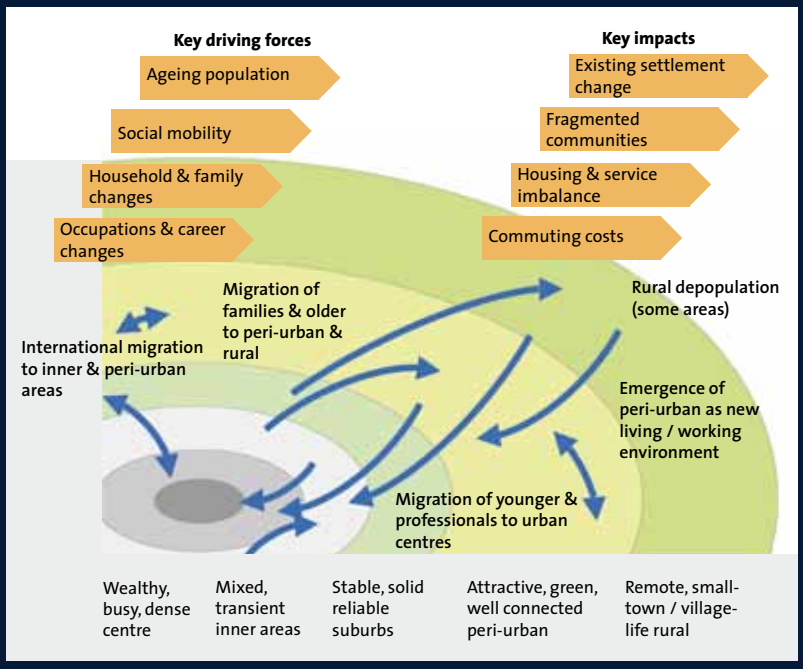
Migration from rural to urban areas is occurring in eastern European and the Nordic countries, as well as Portugal. Meanwhile, other countries are experiencing counter-urbanisation away from urban to rural areas, and this is carried out by those seeking to achieve a better lifestyle in places such as the UK, France, Spain and Italy. Urban growth, triggered by migrants, affects low rent areas, leading to an increase in multi-occupancy and densification. Counter-urbanisation leads to the so called "gentrification" – or social up-scaling – of the peri-urban areas within the urban commuting zone, and sometimes to some repopulation of rural areas.

European labour migration from rural homelands in eastern Europe often targets prosperous western European regions. Non-EU migration from Africa and Asia has an economic or political motivation, especially among asylum seekers.

There are distinct migration patterns of certain ethnic groups that target the former colonising countries including the UK, the Netherlands, France, Belgium and, in the case of political and economic refugees, Nordic countries and Mediterranean Europe.

International retirement migration has again very distinct patterns and distinct land use change effects outside the urban capital areas, with the suburbanisation of rural and coastal areas in Spain and Portugal being particularly large in scale.

Figure 19: Social & demographic dynamics in the peri-urban



Source: UOM

The peri-urban issue: Peri-urban population movement and land use

Urban areas are often the first target for labour-, education- and refugee migration, bringing about the need for more housing and workplaces while making low rent urban quarters more densely occupied and less attractive. The steady decline of urban environment quality makes people – mostly child-rearing younger families who can afford bigger houses with gardens – move to quieter, green suburbs (figure 19).

This makes the peri-urban the second target for migration, which in turn boosts the demand for housing and related infrastructure (e.g. schools, hospitals, recreation facilities, retail centres and production sites) to supply the "new" peri-urban dwellers and the "traditional" urban population with goods and services as well as additional workplaces. All these activities produce additional traffic related to commuting and goods transport, which impacts the environmental quality.

This trend occurs all over Europe, with certain hot spots in the east and peripheral regions in general. The reasons are already addressed above: declining birth rates, migration of the young, active population and rural depopulation. Only some young people (after finishing education) and a few workers return to their former home regions. This is counteracted in some places by retirement migration to rural, affordable but attractive areas, or to the former homelands. Therefore all rural, peripheral, economically weak, often southern and eastern regions in Europe have higher shares of retired people.

The future

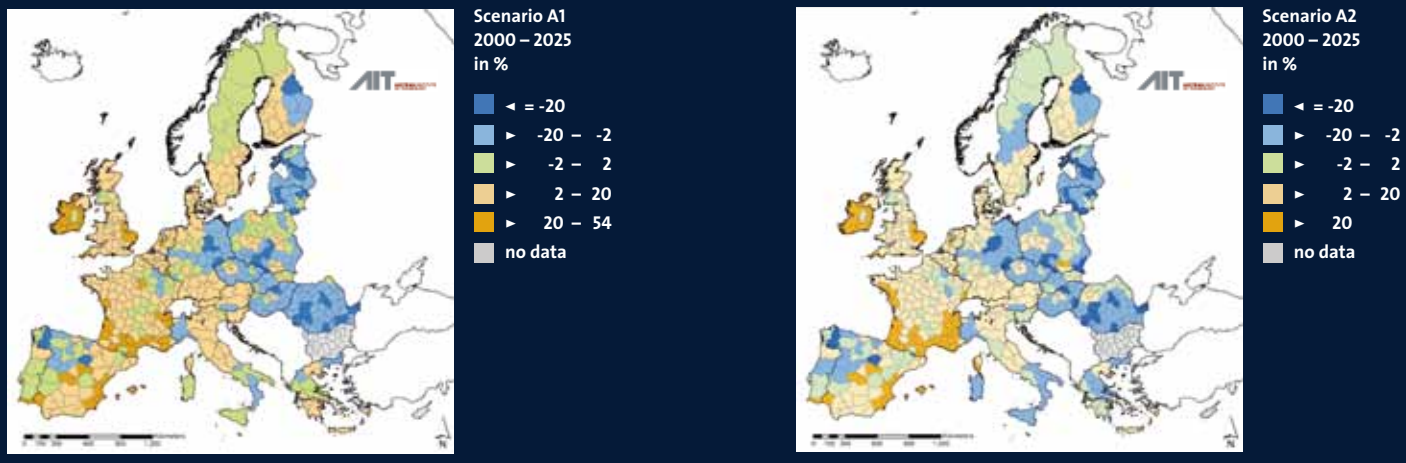
These trends are expected to continue. Dynamic urban areas will attract more people expecting to find better jobs and/or receive a better education, while rural peripheral areas will experience a further depopulation and social fragmentation. Urban centres will tend to experience opposing social transition patterns, in that highly educated, affluent societies will be drawn towards attractive suburbs or city centres while poorly educated, low income migrant classes will develop in low rent, inner city areas or some peri-urban city edge developments. The urban

age class distribution will be more evenly balanced than the rural one because of the in-migration from young people. Peri-urban areas will still attract more affluent families wishing to live in a green environment that is inhabited by a younger population with a better level of education and higher incomes.

But these trends will be shaped by the various possible future scenarios in different ways. The four scenarios describe certain opposite conditions (see chapter 1) where the driving push and pull factors affect the migration patterns in different ways. The following overview describes the general implications of the scenarios in terms of changes to migration and land use:

- Scenario A1 "Hypertech": Labour migration into the cities will continue with less speed.
- Scenario A2 "Waterworld": Migration from rural to urban areas and labour migration within the EU will cease. Non-EU migration will increase due to lack of food and labour, placing pressure on cities and resulting in growth.
- Scenario B1 "Peak oil": High commuting costs will cause people to live closer to their work, leading to the densification of cities. Rural population will decline, leading to extensification or further land abandonment. The rural areas around cities will become more intensively managed for food production.
- Scenario B2 "Social fragmentation": International migration of younger people will be the major driver for urbanisation. The need for regional self-sufficiency in food brings about the recultivation of abandoned land.

Figure 20: Changes in peri-urban population



Source: AIT

Figure 20 shows the population effects on peri-urbanisation for each of these scenarios. In general, heavily declining peri-urban population shares are either the outcome of declining regional development or the product of fast urban growth overtaking the peri-urban development. Stagnation, or moderate reduction, may be a positive signal for the effectivity of planning policies. An accelerated increase of peri-urban population shares is an indication of intensive peri-urbanisation.

The highest changes in peri-urban population shares can be found in central Europe, stretching from the UK to northern Italy and on to Poland and southern Greece. France, Spain, the northern countries and Bulgaria show distinctly less fluctuation in peri-urban population shares. Clear hot spots of growth and decline in an east-west/north-south divide are obvious. In north eastern Europe (Finland, the Baltic States and eastern Europe) the peri-urban population will decline due to a general population decrease, which will increase the concentration of the remaining population within urban centres. The coastal areas of southwest Spain, France and also the UK are expected to experience rapidly increasing peri-urban population shares. In the A1 "Hypertech" scenario, those regions with already high peri-urban population shares (UK, Benelux, southern Germany, Italy and some coastal regions in southern Spain, France and Ireland) will also observe higher peri-urban population growth rates. The "opposite" scenario B2 "Social fragmentation" shows some additional regions with declining peri-urban population shares (in the more peripheral regions of Portugal, Italy, Greece, Poland) but also some regions with increasing shares (coastal regions in France and Spain).

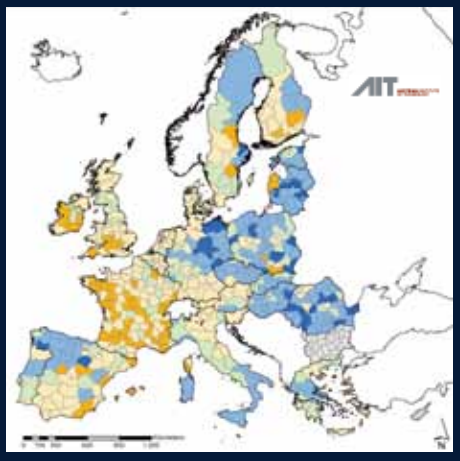
Pull factor quality of life: particularly families with children are settling in the peri-urban

Goals and objectives

The major objective is to achieve a balanced population structure in terms of general population distribution, including age structure and education, in order to promote social cohesion. Integrating the youth as well as the elder generation is a requirement on the way to achieving such a future. Further objectives are to protect green and open space in urban and peri-urban areas, to prevent environmental disadvantages, and to establish attractive quarters for the local dwellers.

Policy challenges

The basic policy targets are to manage growth and control the decline of urban population in an intelligent and inclusive manner. Well developed compact towns serving as sub-centres in the peri-urban may improve polycentric development and avoid urban sprawl, as well as protecting the open space in a bid to support equity in the quality of life and fight social exclusion. Such appropriate measures are the strict zoning regulations in the peri-urban, as well as the restructuring of urban low rent areas. On the other hand, the economic vitality of rural areas also has to be strengthened to encourage young people to return to and reinvigorate these areas. The roots of policies that set out to achieve equal economic opportunities and social cohesions lie in education and the provision of basic infrastructure and cultural landscape protection.



Housing and community

Self-determined lifestyles result in increasing household numbers, accompanied by a growth of smaller households with a corresponding decline in larger ones. To change these trends would require various interventions. The housing market can be one instrument. For example, by building larger flats, couples may be compelled to live together instead of in separate households. Sufficient social infrastructure is another way of improving the quality of life for all population groups in all quarters of a city.

The situation

Europe is home to various social groups with differing educational standards, income levels, age distributions and household structures. We can observe social fragmentation between countries, regions and within the rural-urban regions where people are impacted by economic prosperity, local opportunities and also their community, so that they evolve a certain lifestyle that is influenced by media and local society which includes their parents, teachers, friends and neighbours.

Different lifestyles, income, lifecycle positions and family settings result in different household types with varying demands for floor space requirements, different housing preferences, and different locational preferences for residential areas and the related infrastructure (e.g. schools). This drives the segregation of social groups into, or exclusion from, different dwelling areas and housing types based on alternate levels of affordability. The perception of the city versus the alternative peri-urban target areas, as well as the attractiveness gradients between the former residential area and a future one, are important issues when deciding on location options for the urban versus the peri-urban (figure 21).

As addressed earlier, low rent residential areas are attractive to job-seeking rural people or immigrants with low income who have recently moved into urban centres, and who may not be in a position to consider other location assets. Members of the population who can gradually afford better housing quality will leave these areas in preference of middle class residential quarters – either inner urban or suburban. Childless households with higher education and income levels often stay in the urban cen-

tres, preferring either prestigious apartment buildings in the city centres or high quality suburban apartments in green environments. Meanwhile, families with children often try to settle in peri-urban green environments, where they occupy terraced or detached houses if the commuting distance to the urban centre is important. Households with children and lower income, or those who do not commute, or who tolerate long distance commuting to the urban centres, also settle for dwelling areas located at a greater distance to the cities with cheaper lot prices but little infrastructure. More households consequently demand more flats or houses, and thus more dwelling area.

Household types, household size and housing demands

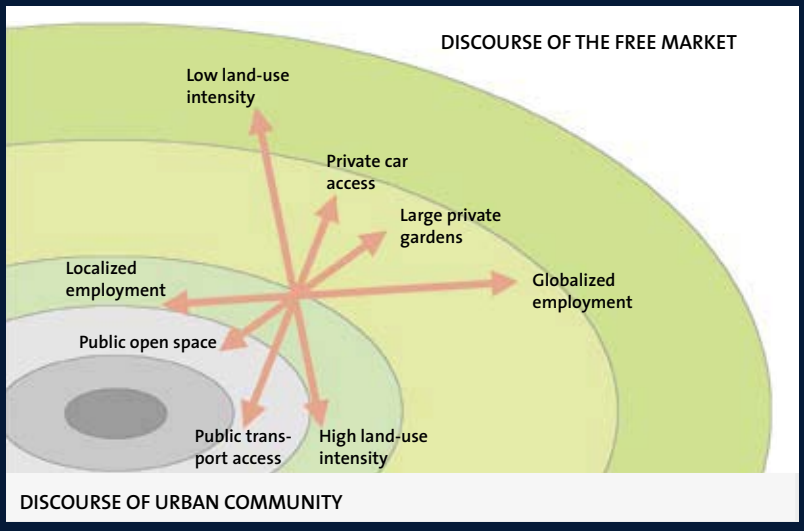
EUROSTAT records the average household size in Europe currently as 2.4 (data from 2004 – 2008), ranging from between 2.1 in Scandinavia and 2.8 persons in traditional Catholic countries such as Malta, Slovenia, Ireland and Poland. As a result of better education and higher female employment rates, such populations exhibit more self-determined lifestyles, which in turn result in growing household numbers that are distinctly decoupled from population dynamics. Even areas with declining population show growing household numbers. As self-determined lifestyles result in fewer marriages, more divorces, one-person and single-parent households, the average household size is declining, while the number of small (one- to two-person) households is increasing. The number of households with four or more people shows a further decrease, with some variation in certain countries and different shares in urbanised versus peri-urban regions. While in urban areas the self-determined lifestyle trends started decades ago and continue today, the population in rural areas, adopting urban lifestyles, are also following the trend towards smaller household sizes.

Nevertheless, decreasing household size is not only a matter of lifestyle. Elderly people exhibit more widow households, which again increases the number of one-person households. Currently, distinctly higher shares of older people are observed in central Europe – in large parts of eastern Germany and in some parts of southern Europe, while Ireland and some northern (Finland, Sweden) and eastern European countries (Poland, the Czech Republic, Slovakia) show smaller shares of aged people.

The future

These trends can be expected to continue into the future. Changing lifestyles will further accelerate an increase of household numbers with a corresponding demand for new dwelling areas. Growing cities will attract more workers arriving without a family who then create one-person households. A sharp growth of higher education shares is expected in Poland and Finland, while some regions in the UK,

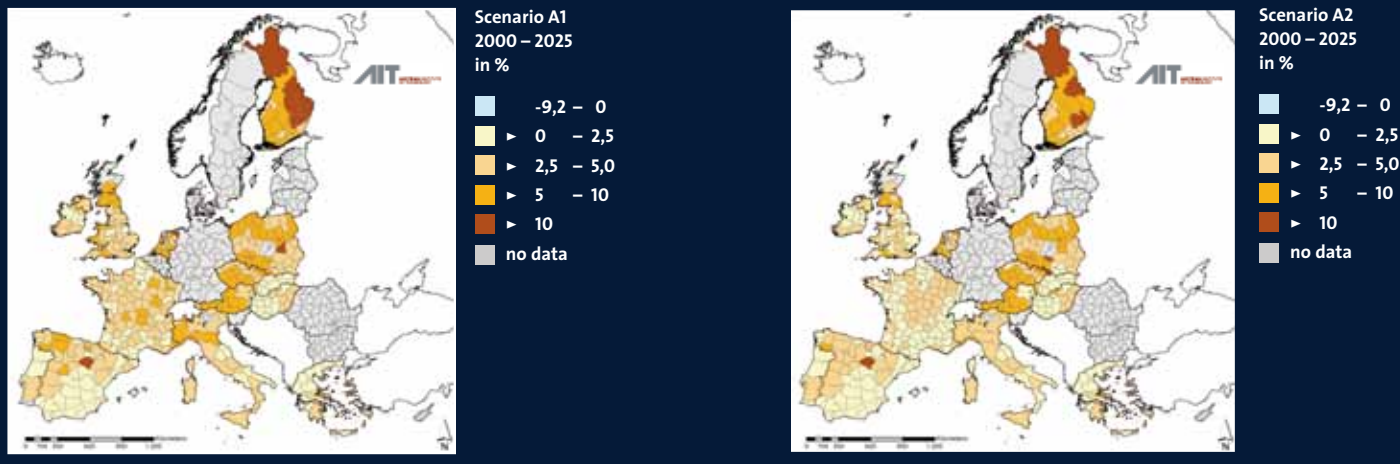
Figure 21: Social & community discourses



Source: UOM

Single family houses are the peri-urban trend. Near Waren, Germany

Figure 22: Changes in proportion of 1-person households



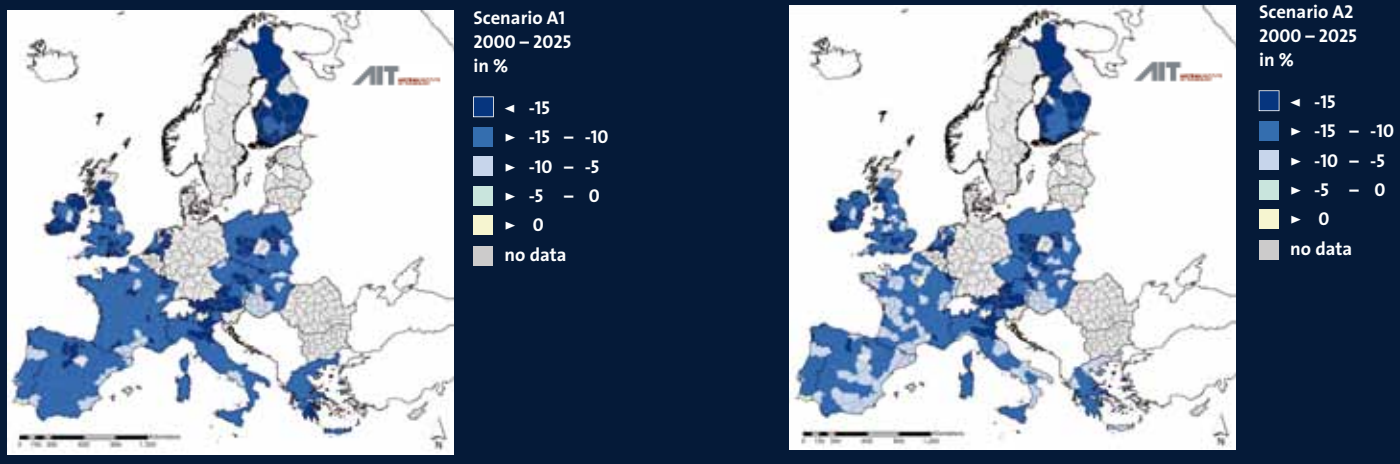
Source: AIT, EUROSTAT

the Netherlands, Greece, Ireland and some French regions will show moderate growth. Growing retiree numbers (in the urban as well as in the rural areas) will further increase the number of one-person households.

The trends may be influenced by different future conditions as defined in the scenarios. The trend variations will follow the variations of the population dynamics, while the influence of lifestyle on the household structure will appear to be stable.

In general, the future trend scenarios predict that peri-urban areas will experience specific dynamics in population movement and economic growth. A certain variation of growth patterns of the peri-urban settlement area can be expected for the coming decades. The hot spot areas with the fastest peri-urban settlement growth will be observed in south England, Benelux, northern Italy and large parts of Germany (as outlined in chapter 1). Moderate growth may occur in France, northern UK, central Europe, the eastern European capital regions, and along the coastal regions of the Mediterranean and southern Scandinavia. Changes of artificial surface shares in the peri-urban will attract households with a different floor space demand. The scenario maps above and below depict the regional differences in the change of household proportions occupied by one individual and four or more people.

Figure 23: Changes in proportion of 4plus person households



Source: AIT, EUROSTAT

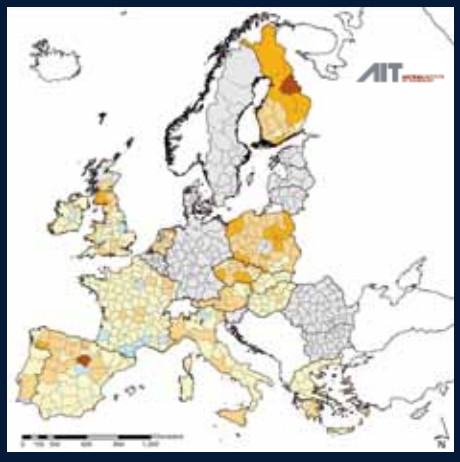


Figure 22 shows projections of the relative change in the share of one-person households for the time span 2000 – 2025. The estimation of the household numbers by household size is based on the GDP as an economic indicator, as well as on population and settlement area distribution in the urban, the peri-urban and the rural areas within the European regions. It is not possible to project the number of these households for the entirity of the EU-27 since certain explanatory variables are not available for regions in some countries.

Scenario A1 indicates an expected increase in the amount of one-person households, with hot spots in Poland, Finland, the Czech Republic, Austria and some regions in Spain. However, scenario B2 suggests less growth of one-person households as economic pressure compels families to live together in larger households. Scenario B1 (Peak oil) in contrast shows rather moderate changes.

The projected change of the shares of larger (four or more person) households is shown in figure 23. The share will further decline, although less decrease is expected in the peri-urban. The bigger households will show distinct decline patterns in Central Europe (Austria, northern Italy, Czech Republic, Slovakia, Poland, Finland, the Netherlands, parts of the UK and Ireland, and regions in northern Spain).

Goals and objectives

One objective is to achieve a balanced population in terms of age distribution and education, as well as a more balanced household structure. An extension of settlement area has to be controlled in order to prevent open space and environmental quality degradation, and also to avoid further urban sprawl with accelerated land consumption. Further measures to achieve these objectives include maximum and minimum zoning, maximum housing density specifications, and the provision of a sufficiently attractive public transport infrastructure.

Policy challenges

The trend towards smaller households is not sustainable due to an increasing demand for housing area, as well as to an increasing number of cars that in turn creates more traffic and a decreasing social cohesion and demographic growth potential. Bringing about a change is a challenge that requires various interventions, one of which may occur in the housing market. Barriers could be established to at least hinder an increase in the number of single family households. For example, by imposing regulations for minimum flat sizes and demanding higher rents, couples may be compelled to live together instead of in separate households. This instrument must be accompanied by rent subsidies for larger households with a lower income level.

Sufficient social infrastructure in the urban and peri-urban is a further issue related to the improvement in the quality of life for all population groups. Mobility via public transport is an important aspect for less mobile people.

Urban lifestyles and single household structures also transform peri-urban and rural societies

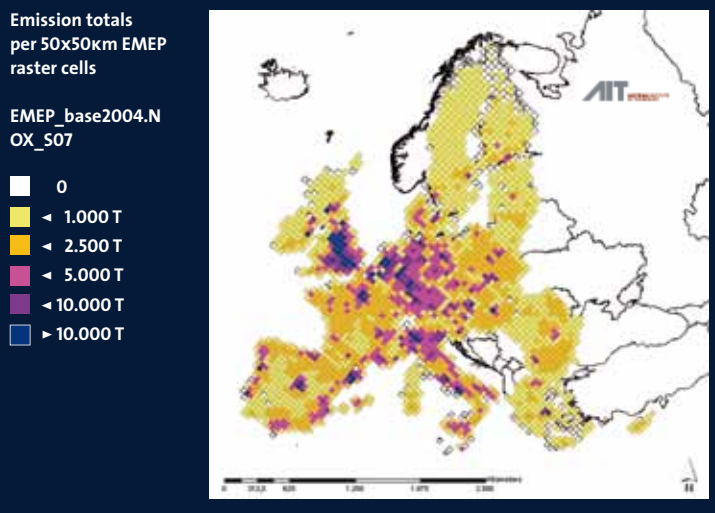
Mobility and transport

At present, low density urban sprawl causes longer commuting distances, increased infrastructure costs, and less viable public transport systems. Urban expansion encourages car use, and car use encourages urban expansion. Policies that support non-motorised transport modes, substituting mobility and planning more accessible land use patterns, are sustainable ways to increase accessibility.

Transport and pollution

The overall air pollutant emission trends in Europe are expected to decline despite an increasing amount of emission-generating activities and goods consumption patterns. However, the trends show different directions and intensities (figure 24). For transport, NOx particulate matter and CO_2 emissions remain a problem. NOx emissions from road transportation are expected to decline despite an increase in traffic, but only to the level when all cars are equipped with a catalyst. Little improvement has occurred in energy efficiency and particulate matter emissions. Therefore, the amount of kilometres covered by vehicles is an important factor in the reduction of air pollution emissions caused by traffic. Urban form and spatial structure are the most important issues influencing vehicle kilometres travelled.

Figure 24: NOx emissions from road traffic



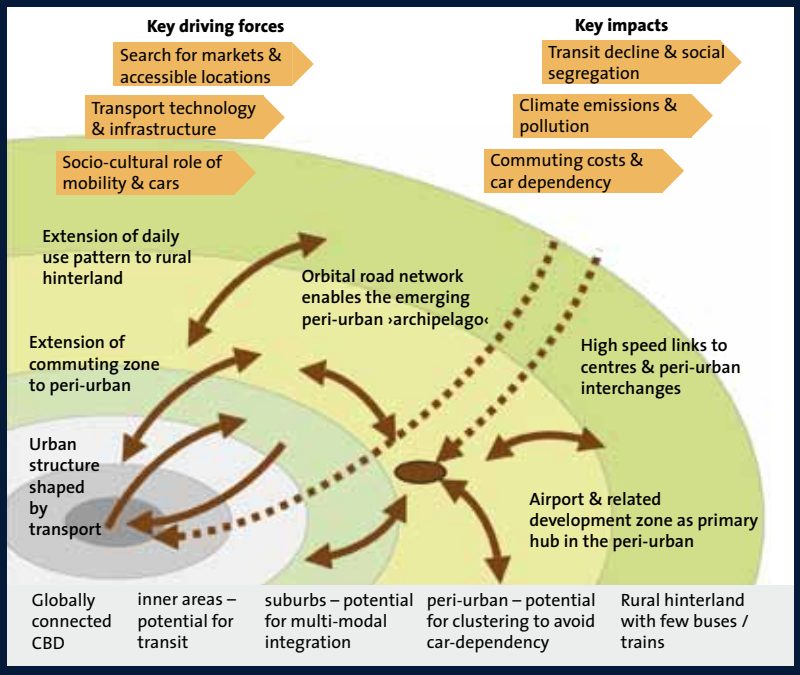
Source: AIT, applying data from CORINEAIR 2004

The situation

The ultimate goal of a transportation system is to be highly accessible. Optimal accessibility is usually reached at densely built areas where destinations i.e. workplaces, shops, services and activities, are all agglomerated. Urban sprawl and low density peri-urbanisation lead to longer commuting and higher emissions. It also tends to exclude low income earners and those without cars.

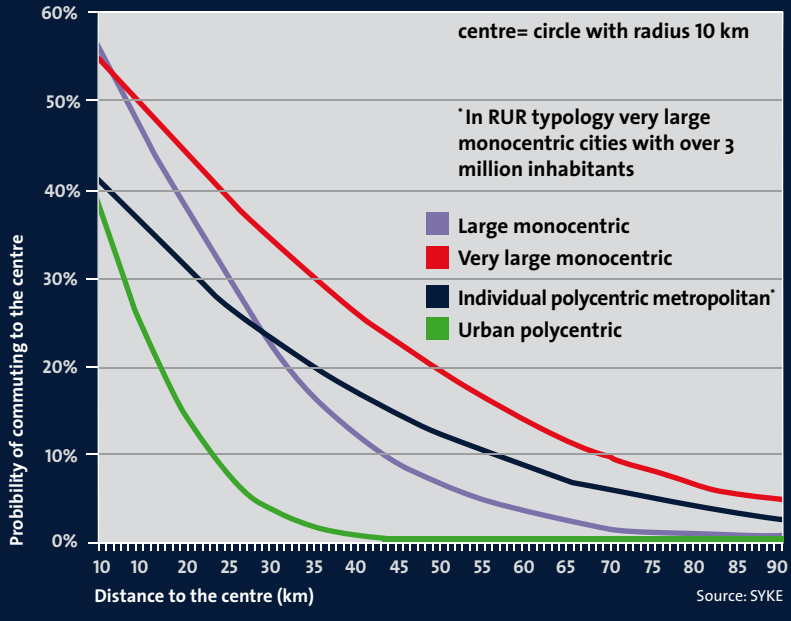
Mobility means actual physical movement including walking, cycling, public transit, car and other

Figure 25: Transport, mobility & spatial dynamics in the peri-urban



Source: UOM

Figure 26: Typical communiting curves for different types of settlememt patterns in rural-urban regions



Source: SYKE

modes of transportation. Increased accessibility can be reached by improving the quality, capacity and speed of the transport system. In peri-urbanisation, the improvement of procedures related to transport infrastructure reduces the environmental impacts, but also encourages longer commuting. However, improvements for the car-oriented transport system tend to increase vehicle-based mobility and thus emissions. Therefore, we need alternate ways to obtain improved accessibility. Policies that support non-motorised transport modes, improve mobility and incorporate more accessible land use patterns are sustainable ways to increase accessibility.

The increased speed of automobile-dominated transport systems increases vehicle-based mobility and creates pressure on the peri-urban use of land. Increased numbers of potential destinations are available within the same allotment of time. As a consequence, people are less likely to prefer local jobs if more distant jobs are otherwise more attractive. Particularly well educated members of the workforce seek job opportunities from specialised regional employment markets. Urban sprawl extends the functional urban area into fragmented, less accessible areas, which reduces the overall accessibility within the urban area (figure 25).

Monocentric and polycentric urban forms differ considerably in terms of commuting patterns (figure 26). The monocentric urban form is an easier objective for the planning of public transportation, whereas the dispersed form, in general, enforces car dependency. In a polycentric structure, several destinations exist within the same distance. Commuting patterns are more varied in such cases. A polycentric structure may in theory minimise commuting costs by shrinking the distance between settlement and employment. Sustainable polycentric urban structure requires a public transport network that can manage commuting between several centres.

There are also differences in the phase of urban development and mobility patterns in European countries. Car ownership rates are the lowest in east European countries, but are nevertheless increasing at rapid pace. City size determines the features of the transport system. Megacities like London or Paris need extensive public transportation systems with fast rail connections to satellite towns, whereas in medium-sized cities, public transport systems remain usually rather compact. At a regional scale, most urban areas provide adequate public transport, whereas peri-urban and rural areas are more or less car dependant.

In the peri-urban areas, urban sprawl increases the variation of origins and destinations of journeys, but decreases the choice of modal options. New patterns of settlement and employment require new patterns of mobility and transport. Fragmented low density areas are by default car dependent. This poses a challenge for people who cannot drive or can't afford a car. The main challenge is to provide a socially and environmentally sustainable transport system that also ensures adequate accessibility for those without cars in peri-urban areas.

When population growth is low, there is no huge pressure on the peri-urban. Weak planning leads to uncontrolled relocation of activities. The direction of intraregional migration is outwards from the main centre, which creates a more polycentric structure. Due to low population growth, land prices remain reasonable in urban areas. Weak transport planning means that any increase in the proportion of the urban area will be car dependent. Commuting patterns that have been oriented towards the main centre change into criss-cross patterns between several centres.

The future

The possibilities for conducting a scenario analysis for transportation systems and commuting patterns at EU scale are very limited due to the high dependencies on local conditions and planning strategies (figure 27). The four scenarios present different population trends related to the planning policy. Population growth is either high or low, and planning policy is strong or weak. Strong planning supports transit-oriented development, whereas weak planning leads to a car-dependent urban structure. Strong planning refers to integrated land use and transport planning, where the goal is sustainable accessibility.

High population growth with strong planning enables efficient land use allocation and the development of a fast and efficient public transport system. In monocentric cities, the functional commuting area extends via traffic corridors with rail connection. Continuing growth with strong planning also changes the urban form towards a polycentric structure with strong public transport links between nodes.

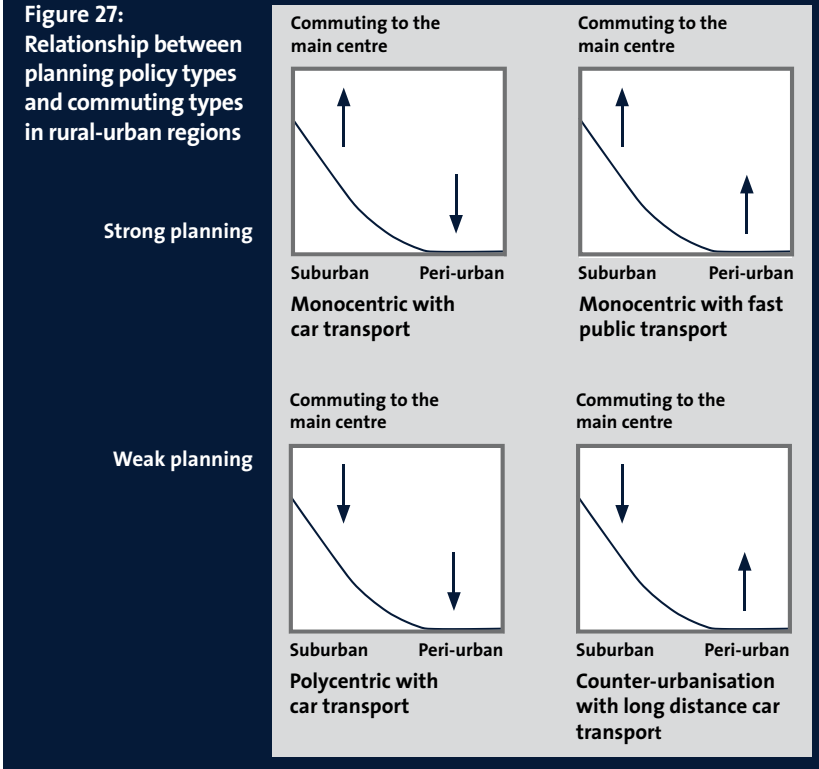
When population growth is low, strong planning enables efficient reallocation of land uses, but densities, especially in the peri-urban, remain low. Peri-urban areas become car dependent. Strong planning supports suburban public transport and discourages peri-urban commuting to the centre.

Weak planning with high growth leads to urban sprawl and counter-urbanisation. Employment relocates from the centre to the suburban, and settlement spreads across the peri-urban. Peri-urban long distance commuting increases, but a fragmented structure does not support public transportation. Most of the urban area is accessible only by car.

Goals and objectives

Environmentally sustainable peri-urban transportation systems are determined by reduced greenhouse gas emissions achieved by: 1) reducing the need to travel; 2) increasing the share of non-motorised and public transport; 3) improving vehicles. Socially sustainable transport systems support modal choice and provide equally high accessibility for all societal groups. The transport system is vital for the local economy, as it links peripheral areas to regional, national, European and global markets.

Figure 27: Relationship between planning policy types and commuting types in rural-urban regions



Source: SYKE

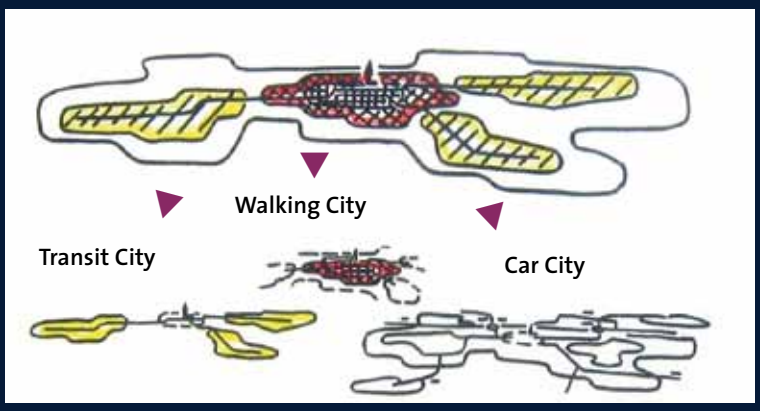
The distances between living quarters and amenities tend to be longer in the peri-urban areas, forcing people to travel. The travel requirement can be limited with integrated transport and land use planning. Higher densities and mixed land use minimises the need to travel long distances between different areas of land use. Virtual interactions can also substitute physical travel. Technological solutions for teleworking and e-commerce are improving continuously. However, leisure trips increase the amount of total journeys made, which makes the objective of reducing the amount of time spent travelling even more challenging.

Lower levels of car dependency can be achieved by increasing the share of public transportation. In low density areas, regular public transport is usually not profitable. Land use planning should be able to create transit-oriented districts in the peri-urban. In these areas, public transportation should be based on a multimodal transportation system that connects various modes such as 'park and ride' facilities. Peri-urban public transportation systems should utilise existing local and regional rail and road connections and generate transport corridors between cities.

High quality peri-urban public transport systems consist of a well planned network of routes with timed connections between services. Timetables and ticket systems of different modes should be synchronised. This requires the co-operation of different operators. Metropolitan train connections with regional and local bus connections should be coordinated at a strategic level where the whole network is taken into account. It is also important to encourage passengers to accept transfer between modes in multimodal systems. This is made easier if public transport is able to compete with car-based transport when comparing the amount of travel time to the centre. When cars are the only solution for transportation, environmentally friendly options should be encouraged. This means the implementation of new technology vehicles with low emissions.

Accessibility to the regional and urban transport network is essential for rural communities (figure 28). In economic terms, the competitiveness of a territory is determined by good accessibility. At an individual level, accessibility is defined by available opportunities for bridging distances. In both cases, the transport system is vital for the cohesion of functional regions. An integrated transport system is a basis for social inclusion and cohesion in the peri-urban area.

Figure 28: Systems of the urban structure



Source: Leo Kosonen, Kuopio 07.04.2005

Policy challenges

The transport sector is facing a major challenge in trying to meet the requirements for reducing greenhouse gas emissions. At a general level, policies should concentrate on breaking down the link between economic growth and an increase in mobility, and support the urbanisation trend that generates sustainable accessibility. Good accessibility requires integrated land use and transportation planning.

Within the peri-urban areas, the main policy challenge is to provide multimodal accessibility and avoid car dependency. The question is how to coordinate this and obtain investment for multimodal transport options in a diffused and fragmented peri-urban area, and also how to position urban developments and activities in the most accessible locations in the peri-urban.

Commuters arriving on an early morning train. London, UK

Food and farming

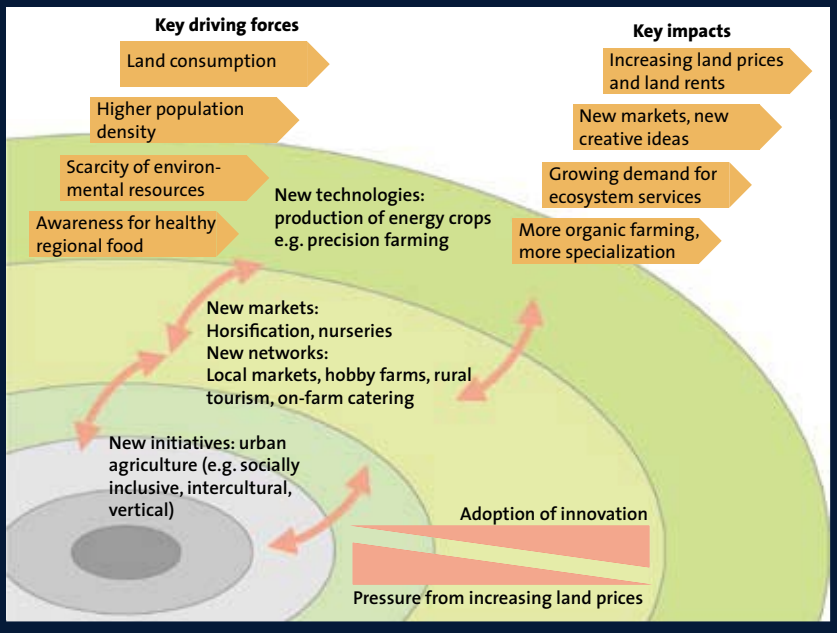
Pressures on agriculture are high in peri-urban areas. As a result, conflicts between farming and other land uses are more intense than elsewhere. On the other hand, particular opportunities for sustainable agriculture emerge in this environment – from the neighbourhood to the market.

The situation

European agriculture is multifunctional. It produces food, fibres and renewable energy, but also natural and cultural resources that we have increasingly come to value, such as biodiversity, traditional landscapes and the capacity to mitigate climate change.

European agriculture takes place in the urban-rural context. Though most land devoted to agricultural use is located in rural areas, the functions of agriculture have to be seen as a complex exchange between urban and rural regions (figure 29). The majority of consumers live in towns (72% average in Europe), where they do not only demand sufficient and healthy food, but also public goods like clean water, and that the surrounding countryside is of great natural, aesthetical and recreational value.

Figure 29: Spatial dynamics of agriculture in the peri-urban



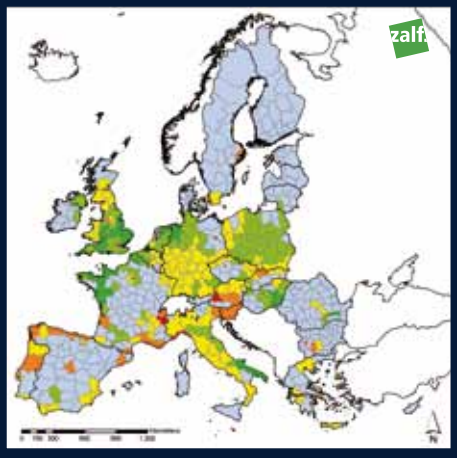
Source: UOM

Table 8: Characteristics of important agricultural regions with peri-urban situation

Region	Peri-urban share (share of total area)	Agricultural land (gross margin)	Farm productivity	Part-time farming
South UK	above average	high	(rather) low	medium
Northern Germany	above average	high (scattered)	medium	low
The Netherlands	above average	high	high	low
Belgium	above average	high	high	low
Atlantic coast France	above average	high	medium	low
Mediterranean coast France	above average	low	high	low
Mediterranean coast Spain	above average	medium	high (south)	high
North Portugal	above average	low	low	low
North Italy	above average	scattered	high	high
Eastern Mediterranean coast Italy	above average	high	scattered	high
Southern Italy	above average	scattered	high	high
Poland	above average	high (scattered)	low	medium
Hungary	above average	high (scattered)	low	low (scattered)

Peri-urban themes for agriculture: zoning, long term development perspectives, land prices, competition

Figure 30: Agricultural Area in peri-urban regions in EU 27

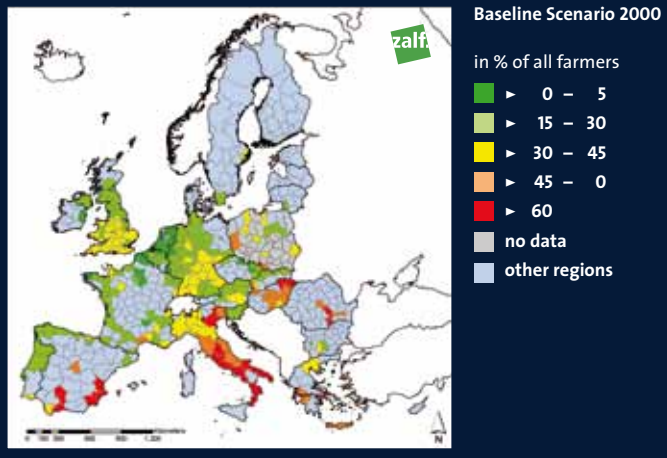


Source: ZALF, EUROSTAT

Farm productivity in peri-urban regions in EU27

Regions where peri-urbanisation and agricultural land use coexist are important, and are therefore worthy of a more detailed examination (figure 30). There are regions in Denmark, north western Germany, the Netherlands and Belgium where the main use of land is devoted to agriculture while also containing an above average share of peri-urban areas. This is also the case in large parts of Poland, the Atlantic coast of France, eastern Italy, parts of Hungary and the south of the United Kingdom. These regions can be characterised according to table 8. Some are run in a highly intensive manner, often with horticultural production and high economic productivity (e.g. the Netherlands, Denmark, Spanish and French Mediterranean coast, as well as northern and southern Italy). Other regions have a traditionally strong crop or grassland production. The amount of part-time farming is used as a proxy indicator to assess the degree of professionalism of farming. In southern Europe, part-time farming is often connected to a breakdown of the inheritance and patrimony system, and is therefore also a proxy for the ageing of farmers. High amounts of part-time farming can even indicate an increased likelihood to end farming activity entirely, and for a region, a higher probability of structural change in agriculture. In regions where low soil fertility and low farm productivity are also factors, such assessments might indicate a likely increase in land abandonment. A risk of sprawl due to low land prices may also be applicable. In other more favourable conditions, there are pressures to increase the size of those farms that are remaining, or to increase the diversified multifunctional agricultural uses thereof.

No. of part time farmers in peri-urban regions in EU27



The future

Future global change will affect agriculture. Innovation has always been a key driver for increasing agricultural productivity. Precision farming and genetically modified organisms are examples of future trends in technological or biotechnological innovation. But innovation also means gains in knowledge. With shrinking spatial potentials, intensification by means of innovation will gain more importance. PLUREL scenario A1 examines this issue.

Climate change will lead to higher risks of flooding in northern Europe, while droughts will seriously affect yield and soil fertility in southern Europe. Agricultural land use can be a most effective climate change mitigation strategy by maintaining soil fertility, ensuring cropping patterns that positively affect groundwater renewable capacity, reducing erosion risk, keeping grassland in management in wetland areas, and by maintaining the stores of carbon in soils. PLUREL scenario A2 covers these aspects.

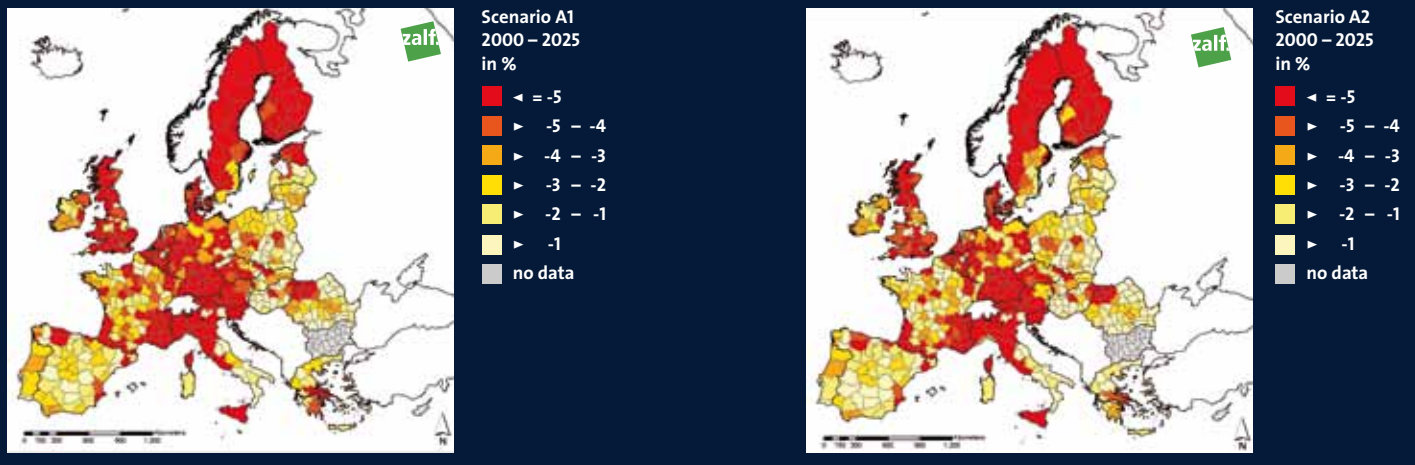
Although it is an increasingly important supplier of green energies, agriculture is strongly dependent on fossil energy, which is essential for Nitrogen fertiliser production. Agriculture is therefore sensitive to the risks of the 'Peak oil' crisis that PLUREL scenario B1 refers to.

Demographic change affects labour in agriculture in peri-urban areas. The ageing of farmers, as well as the migration of the younger generation seeking urban work places, will not only be a particular problem in remote regions, but also in peri-urban regions where better paid jobs are available, maybe even while maintaining the farmstead as a housing site. Part-time farming and hobby farming are therefore trends that require careful study, with particular regard to sustainability impacts. PLUREL scenario B2 is related to this issue.

The results in figure 31 show that consumption of agricultural land by urbanisation will continue in all parts of Europe independently of the future global scenarios which we assume. This is particularly the case in large parts of Scandinavia where afforestation takes place. It also holds true for the UK, central Europe, the Mediterranean coastal areas and parts of Romania. In each of these countries, more than 5% percent of the currently used agricultural area will be turned into artificial surfaces. Among the peri-urban areas with major agricultural importance, the Netherlands, Belgium and the Mediterranean coast of France will suffer the highest loss of agricultural land, while in places like northern Germany, Poland and Hungary, the degree of land consumption will occur in a more scattered pattern. In addition, highly productive soils associated with intensive use and larger farm structures will be affected, as well as areas with a rather low economic performance and a high proportion of part-time farming.

On the other hand, all scenarios indicate a considerable increase of farm productivity in economic terms. In rural areas, the economic improvements

Figure 31:
Changes in Agricultural Area

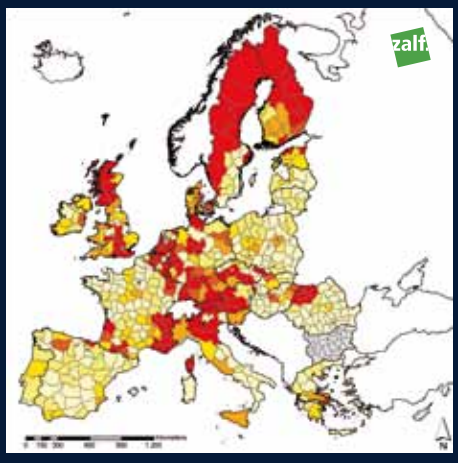


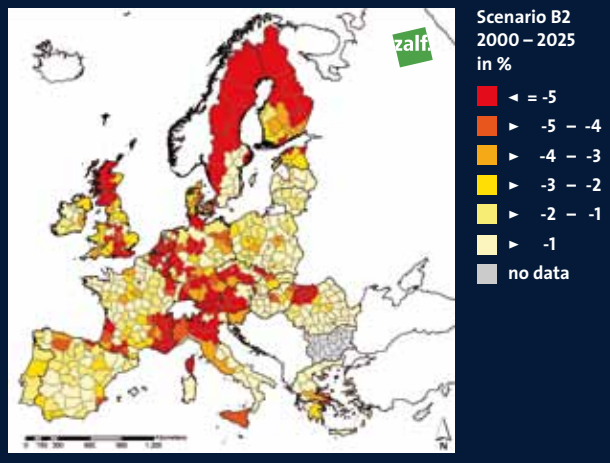
Source: ZALF

are particularly expected in rather extensively run, predominantly mixed farming or grassland regions in partially remote mountainous areas (Alpine region), or in east European regions with small scale farming structures, such as the Baltic States and northern Romania. The latter regions show an increase of farm productivity that is independent of the scenario. In peri-urban regions, the advantages of technological progress within the Hypertech scenario (A1) are more distinct than in the other scenarios. Innovations seem to be adopted more rapidly and converted to a growth in farm productivity. Among the peri-urban regions, those that are most successful in strengthening the economic power of the agricultural sector are expected to be able to limit extreme losses of agricultural land, such as the UK.

Part-time farming will gradually be reduced all over Europe at a similar rate that agricultural area is also reduced (-1 to > -5%). This will be most prevalent in regions with high amounts of peri-urban areas, such as in southern Germany, the Czech Republic, Austria, northern Italy and other regions which already today are characterised by highly professional agricultural or horticultural use, such as in the south of the UK, the Netherlands and southern France. In south and south east Europe (Italy, Spain, Hungary, Romania and Bulgaria) where a high share of part-time farming is traditionally typical, this strategy will likely be continued (except for a few regions in northern Romania) and will occur regardless of whether urbanisation pressures are high or low.

For decades the Berlin wall separated Gropiusstadt and the arable fields in the south of Berlin. After the reunification, urban planning kept the functional separation. Berlin, Germany





Goals and objectives

Peri-urban regions do not only experience the sprawl of suburbs and malls. They are also the space of creative multifunctional agriculture, as well as the area experiencing the highest urbanisation pressures on agriculture. The main problem relates to the loss of area through the conversion of land for settlement and infrastructure purposes. Land prices rise and long term planning security falls, for example, when it is measured in terms of land-rental contract duration. As a consequence, urbanisation influences the structure of agricultural production even more. Farm sizes, the socio-economic situation of farms, and farm households change. Farms without successors become subject to part-time farming, hobby farming or otherwise disappear, as other farms grow and specialise (Zasada, 2011). Depending on natural yield expectation and urban-rural development conditions, the broad spectrum of adaptation processes will occur in aspects that relate to specialisation (e.g. horticulture, nurseries, horse keeping), extensification (organic farming), diversification (agrotourism) and land abandonment, with negative impacts on the natural and recreational value of the region.

On the other hand, peri-urban areas offer particular opportunities for agricultural land use. The entrepreneurial activities of farmers tend to stem from directly perceived societal demands and expectations, but also from new market opportunities that emerge in a creative urban environment. Examples that can be found all over Europe are direct marketing at local food markets (especially for organic food), new niche products, services (riding facilities), community farming initiatives and new institutional forms for nature conservation. Typically, they all have a high degree of social inclusion in common.

In recent years, creative green urban trends have explored agriculture and gardening as activities where production, leisure, political action and community building merge into a fruitful and colourful mix. 'Guerrilla gardening', 'transition agriculture' and 'nomadic green' are the keywords of such movements.

Producer – consumer interaction: farmers plant market

Policy challenges

Policy action should be directed to strengthen the role peri-urban agriculture can play in mitigating the following problems in the urban-rural context:

- The problem of increasing disparities between urban and rural, not only of economic nature, but also referring to biodiversity, landscape value and demographic change. The ageing of farmers is the key problem of agriculture, not only in remote areas, but also in the peri-urban. Peri-urban areas with a clear commitment towards maintaining agriculture can offer an attractive location for young innovative agricultural entrepreneurship, since the adoption of innovations in peri-urban regions is high;
- The problem of climate change impacting towns. Agricultural areas in the peri-urban fringe are buffer zones that provide water storage, filter air and prevent erosion. Local production of food close to large human settlements also means fewer transports, and should therefore be part of a strategy for reducing CO_2 emissions;
- The problem of natural value loss in the urban fringes. Peri-urban regions are important open spaces in the directly accessible surroundings of towns, and agriculture is able to keep them open without public expenses. To ensure this remains the case, long term guarantees are required to ensure security for the strategic decisions made by farmers. For example, planning strategies and rental contracts of a minimum 10-year duration are important incentives for farmers to make investments that will secure the economic future of peri-urban farms;
- The problem of local identity loss, and the loss of viable urban-rural community ties. Peri-urban agriculture is important for local identification and societal interaction through local products, traditional agricultural management practices, landscape preservation activities and seasonal events.

Maintaining cultural identity: traditional harvesting method in an olive grove. Near Grosseto, Italy

Environment and landscape

Ecosystem services and the character of a landscape in peri-urban areas can be very negatively impacted by urban growth, depending on the way this growth occurs.

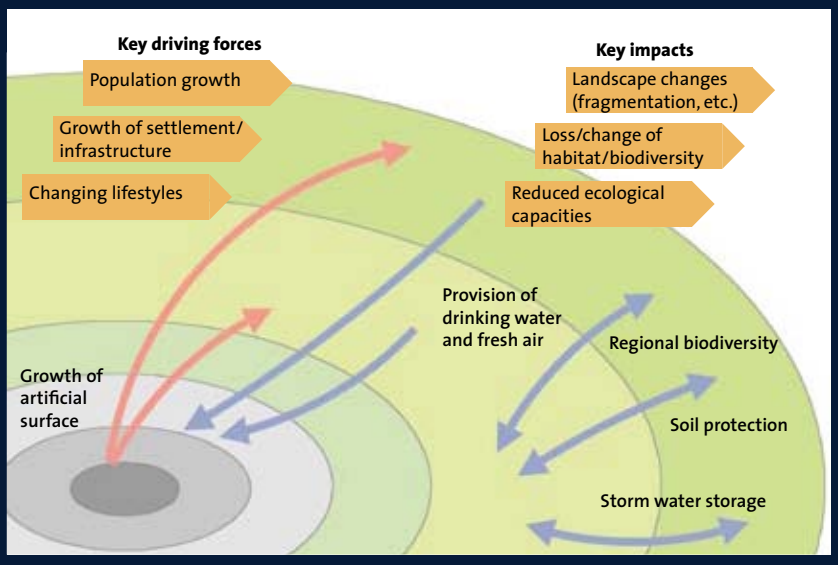
The situation

Landscapes that are characterised by large expanses of green and unsealed open spaces fulfil valuable ecosystem services, namely the regulation of ecosystem processes and the provision of habitats for species. They are important for the regional supply of drinking water, soil protection, flood control and the moderation of urban climate, as well as the reduction of air pollution. They also play an important role in climate-relevant carbon sequestration. Therefore, urban areas depend on the integrity of ecosystems to assure the local self-sustenance and provision of biotic and abiotic resources, as well as the toleration of alternating framework conditions such as climate change. Peri-urban areas have to be taken into consideration from the ecological perspective. Due to their heterogeneous land use pattern and habitat niches, these areas are often home to a high diversity of species. The proximity to urban centres increases their importance as sources of ecosystem services. But the dynamic of urban growth here aggravates the negative ecological impacts (figure 32).

The fragmentation of the landscape through infrastructure has a negative impact on ecosystems and species habitats. The index of Effective Mesh Size (MESH) represents a suitable indicator, since it

Habitat losses in the peri-urban: often caused by fragmentation due to infrastructure

Figure 32: Spatial dynamics of environment & landscape in the peri-urban



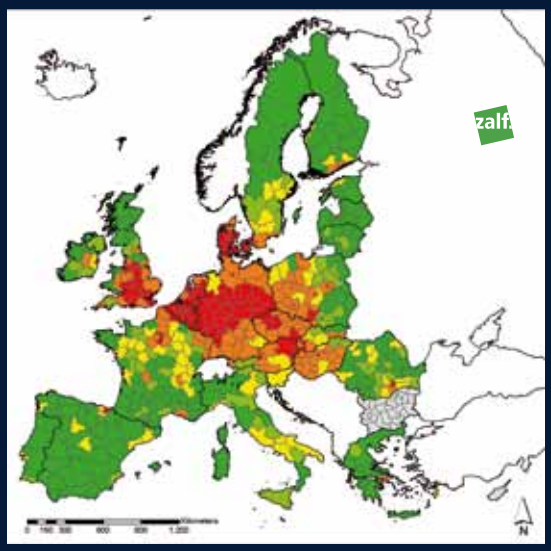
Source: UOM

indicates the probability of individuals meeting in a landscape fragmented by infrastructure and settlements. Figure 33 shows the situation for this index in the year 2000 within the EU-27. Not surprising, it is observed that the index is closely related to the degree of urbanisation, and also that mostly rural and remote regions possess comparably large and continuing habitats. Fragmentation is concentrated in central western Europe, where only small patches of open landscapes remain. Low landscape fragmentation, in contrast, cannot only be observed in regions with low population density, but also in large parts of northern, eastern and southern Europe.

Management of open landscapes providing important ecosystem services, such as water retention and reduction of flood risks. Elbe river. Germany

Due to an economic requirement to increase efficiency in production, farming and forestry, land use systems have become larger in size, and in so doing, have reduced the amount of marginal land. Furthermore, urban growth (following a very similar pattern of sprawl) and ex-urban development have both contributed to a shrinking diversity and homogenisation of landscapes. The landscape structure has been spatially analysed based on landscape metrics, which give valuable insights in the intermixing, continuity and diversity of land cover at a landscape level, and has revealed that urbanisation contributes to a greater evenness and a reduced continuity of the landscape.

Figure 33: Landscape fragmentation (Effective Mesh Size)



Baseline Situation in 2000 in km²

- 0 – 250
- 250 – 500
- 500 – 750
- 750 – 1000
- 1000
- no data

Source: ZALF

The future

Along with increasing welfare, changing lifestyle and consumption patterns, urban growth is most likely to continue, especially in the conversion regions of south and central eastern Europe, where increasing pressure on ecological functioning of landscapes is causing soil compaction and the sealing, or disturbance, of soil horizons. Within urban areas, the hydrological capacity of soils to receive water from the surface is thus depleted, along with the ability to recharge groundwater and cope with extreme meteorological events. In the context of climate change, the effects of urban growth on ecological functions are aggravated. In urban areas, the ecological balancing capacity is limited to a few areas, such as housing green, street green or parks. Soil sealing differs between European regions as a result of varying urban development and design traditions. In Germany, approximately half a city's area is considered to be sealed. In southern and eastern European countries, urban areas are more densely built-up, leading to higher degrees of imperviousness.

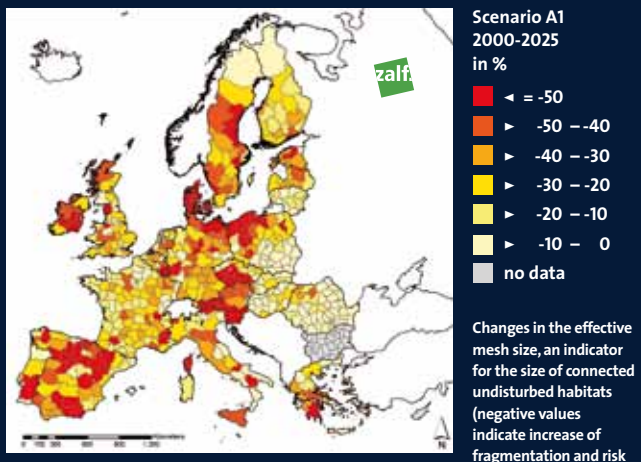
Figure 34 proves a spatially differentiated pattern of the changes in landscape fragmentation due to urbanisation within the time span 2000 – 2025 in scenario A1. A remarkable decrease of Mesh size up to 40%, which indicates a strong increase of landscape fragmentation and, accordingly, a deterioration of ecological and habitat value, can be observed in parts of Denmark, Sweden, Ireland, the Polish Baltic Sea coast, many regions of Spain and in Sicily.

Characterised by their composition of individual patches and structures of various land cover types, landscapes will undergo major alterations in terms of their diversity and continuity. With the European transportation infrastructure network expansion, open landscapes will become increasingly fragmented (figure 35). Roads and rail tracks will transform the physical conditions on and adjacent to the landscapes, creating edge effects. Settlement structures will also account for fragmentation effects. However, flows of matter, energy and species will be modified, while habitats are degraded and destroyed, which affects the abundance, composition and the diversity of species. A massive shrinkage of habitat sizes has to be expected in regions around metropolitan core areas.

Goals and objectives

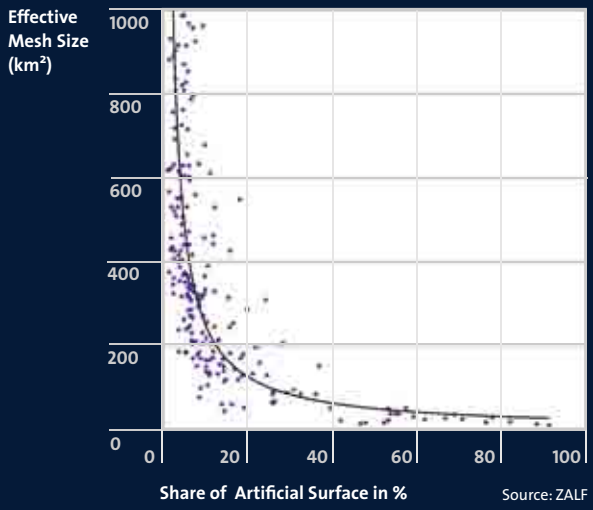
When considering the assessed future land use conversion for urban purposes, the associated extension of the infrastructure network, and the transformation of the land use composition, it is inevitable that further reduction will occur in ecological regulation, balancing capacity and biodiversity. These development trajectories are additionally particularly aggravated in the face of climate change,

Figure 34: Changes in landscape fragmentation caused by urbanisation



Source: ZALF

Figure 35: Landscape fragmentation response to urbanisation



Source: ZALF

with its impacts in many European regions like the Mediterranean basin. There is a clear necessity to understand and sensibilise to the consequences of urban growth and to implement strategies if not to reduce it, but at least to come up with solutions that will marginalise its negative effects. In the landscape context, several development objectives can be drawn from this requirement.

- Efficient use of space and resources. Resource efficiency embraces smart growth, landscape management concepts and solutions of densification in urban areas without reducing local environmental quality by reusing derelict urban land for urban development or renaturation.
- Preservation of valuable ecosystems and the maintenance of their continuity and connectivity. Three ways of achieving this are, firstly, to bundle transportation infrastructure, secondly, to concentrate in the urban area, and thirdly, to extend the flora-fauna-habitat network. Human disturbance and urban growth in ecologically valuable landscapes should be reduced to an unavoidable minimum.

Policy challenges

- European Policies: It is highly advisable to review the impact of policies on ecological functioning in existing and implemented European policy action, such as the Trans-European Network of infrastructure, or the European Cohesion and Structural policy. Since environmental and landscape issues and regional responsibility do continuingly require attention in European spatial policy, it is recommended to both strengthen this perspective and to raise awareness of landscape impacts in European policy wherever it is related to spatial development.
- The regional focus: It is also advisable to integrate and commence dialogue with local and regional landscape initiatives, authorities and NGOs to make use of the endogenous knowledge of the regional conditions. This supports a more regional perspective, which is then increasingly able to take the large regional variability of landscape into account. Secondly, by shifting the decision making capacity and responsibility to regional and local authorities, it is suggested that funding (of the likes provided via the European Structural Funds) should be distributed to the lower administrative level. More generally, the economic perspective of ecological and landscape topics requires reformation, since both topics suffer from monetary undervaluation. Financial investments are necessary to comply with European legislation and directives on environmental quality (e.g. FFH, air quality, nitrate balancing or water supply). Moreover, payments for ecosystem services through the second pillar of the Common Agricultural Policy, as well as other sources, need to be expanded.

Landscape fragmentation by railway

Recreation and tourism

European peri-urban and rural landscapes are essential places for recreation and tourism, but are threatened by their own attractiveness.

The situation

Along with their productive and ecological relevance, European landscapes account for a broad range of socio-cultural values. This includes their usage as a place for nature-focussed recreation, leisure and tourism, but also as an important element for the construction of regional identity. Europe's appearance is characterised by a huge variety of regionally recognisable cultural landscapes that are created by biophysical conditions, the traditional farming and forestry land use systems in place, as well as the built-up environment. Cultural landscapes are essential as living environments, but also as a source of heritage and identity. Urban transformations contribute to an erosion of these socio-cultural values (figure 36). This is not only the case for landscapes of international prominence, such as Tuscany, the Dresden Elbe Valley or Cornwall, but also for other lesser known ones, such as Cantabria in Spain, Maramures in Romania or Kocevje in Slovenia.

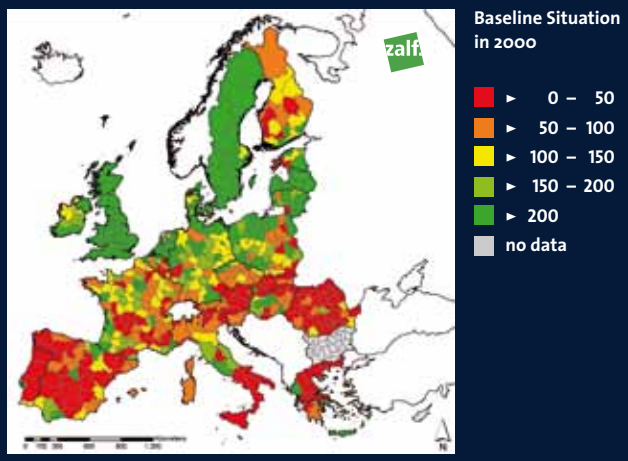
The role of landscape and nature for recreation and tourism purposes incorporates a number of activities, from hiking in the forest or riding a horse, to visiting theme parks or heritage sites. Peri-urban regions are particularly favoured by urban and peri-urban inhabitants for daily recreation purposes. In addition to green urban areas, the countryside around cities also represents an important part of

New leisure landscape in the peri-urban: Golf course near Torrevieja, Spain

the green infrastructure, with its adjacency to and accessibility from the inner cities, as well as its dense allotment of leisure services and facilities. From that perspective, peri-urban areas contribute eminently to the local quality of life. Attractive peri-urban areas suffer, but do also gain from different kinds of pressures (figure 37). For instance, in Manchester there is a ring of multifunctional country parks, community forests and 'access land' under the ownership of a water company. In Haaglanden, a peri-urban area competes with glasshouse cultivation and the artificial maintenance of farming adjacent to large populations. In Leipzig, there is extensive green infrastructure that is turning the problem of urban shrinkage into an opportunity for an ecological city.

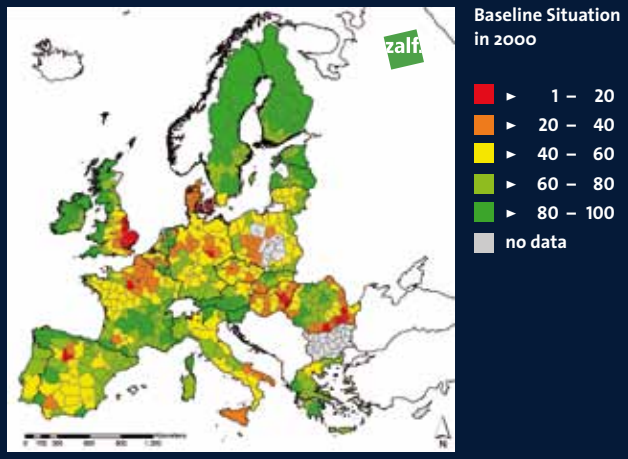
Attractive landscapes in peri-urban areas are also subject to domestic and international tourism. Here, the natural features of the region such as waterways, landscape relief and natural environments are of particular relevance. Measuring the landscape's recreational capacity at the EU regional level, the Green Background Index (GBI) indicates the probability of natural attractive environments occurring in a region (figure 38). Its value is negatively influenced by the degree of urbanisation and intensive anthropogenic farming/industrial land use. The attractiveness of a landscape also encourages rapid urbanisation, as the example of the Costa Blanca region in Spain illustrates (figure 39) (Zasada et al. 2010). The proximity to a coastline leads to a concentration of housing and leisure facility developments, in turn creating new urban and peri-urban spaces.

Figure 37: Urban Green Neighbourhood Index



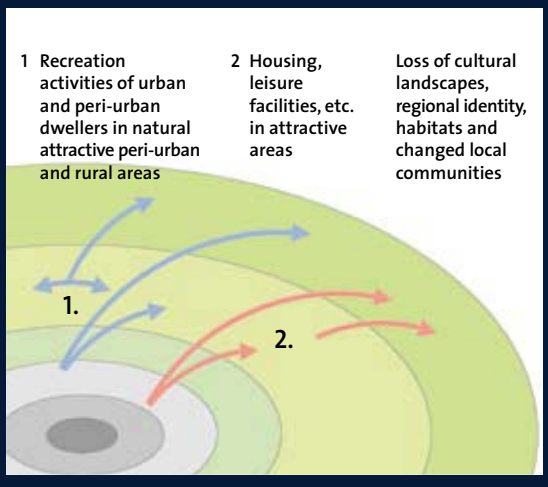
Source: ZALF

Figure 38: Green Background Index



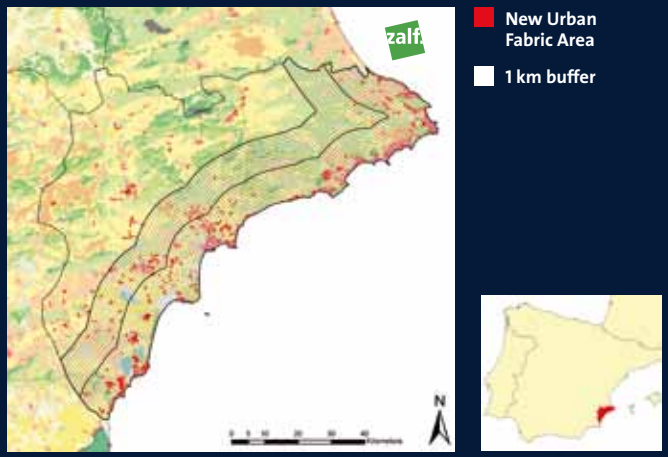
Source: European Environment Agency (EEA), ZALF

Figure 36: Spatial dynamics of recreation & tourism in the peri-urban



Source: UOM

Figure 39: Urban Growth in Alicante Region 1990 – 2000



Source: EEA 2007, Eurostat 2007, ZALF

The future

Agricultural areas and natural habitats will tend to diminish in European peri-urban regions, while the amount of sealed surface increases. This shows in a very clear manner the decreasing recreational attractiveness associated with increasing urbanisation. Nevertheless, higher incomes and demographic change imply a higher need for recreation, as this is part of the supposed lifestyle of non-working people, mainly of those in their retirement years.

If current economic, social and industry trends continue, tourism worldwide will grow at an average rate of 4.1% a year (European Travel Commission, 2011; EEA, 2007). On the one hand, leisure and recreation will become important drivers in land use change, urbanisation, economic development and social change, which can, for example, include the construction of golf courses, large indoor or semi-outdoor sport facilities and hotel complexes. On the other hand, the recreational capacity of cities and regions will be heavily affected by urbanisation as open space is lost through land conversion while transport emissions increase. Still further pressure is expected to be added to open spaces as the number of people rises. Urban sprawl and ex-urban development will continue to contribute to a shrinking diversity and homogenisation of landscapes. Both the appearance of cultural landscapes as well as the recreational capacity will be affected.

Goals and objectives

- To provide high quality and accessible open spaces, which shall include the maintenance and development of the peri-urban green infrastructure, the qualification and integration of peri-urban open spaces, and farmland or forests for urban recreation.
- To provide suitable and accessible recreational open spaces for all kinds of social milieus – independent of their members' age, income, ethnicity or educational background.
- To develop sustainable tourism and the use of landscape amenities to encourage smart tourism, particularly in sensitive natural areas.
- To preserve and develop cultural landscapes to conserve the cultural diversity and rural identity of European landscapes – not only of the rural ones, but also peri-urban and urban areas as requested by the European Landscape Convention.

Open space – space for recreation, outdoor activities and cultural identity

Policy challenges

There are libraries of policy statements on 'sustainable tourism', and much progress has been made in this field. The problem of urbanisation still continues however, and the contribution of recreation and tourism still grows. Major policy goals and challenges aim to find a balance between new opportunities (economic, social, and environmental) and the problems created that are centred on the peri-urban:

- Spatial development in the peri-urban – use the opportunity of recreational areas as a means to limit urbanisation;
- Landscape and ecology – maintain and enhance the ecological integrity and green infrastructure;
- Land management – reuse derelict urban land, or under-used rural land, for recreational purposes;
- Transport and other infrastructure – plan and manage sites and facilities for the lowest impact provision of transport, water and other services;
- Agriculture and diversification – provide opportunities for visitors, farmers and entrepreneurs;
- Local economic development – aim for local spin-offs and reinvestment opportunities where recreation is the major employer and target of investment;
- Local community development – aim to integrate visitors and new home owners into existing social and cultural communities.

Managing Growth

This chapter analyses the role of the public sector to manage growth in peri-urban areas.

The public sector has strong role to play to ensure sustainability in the rural-urban regions. This chapter explores the various means to perform this role: through the formal government system and spatial planning policies; through financing and taxation systems and sectoral policies; with the help of regulatory tools; and finally by using informal governance type processes.

The analysis highlights the importance for effective formal institutions, policies and regulations at the rural-urban region level, especially targeted at the peri-urban areas. Governance processes can become useful extensions, but cannot substitute for the non-performance of the formal institutions and policies in rural-urban regions.

The previous chapter gave an overview of how the different peri-urban agendas (economy and employment, population and migration, housing and community, mobility and transport, food and farming, environment and landscape, recreation and tourism) all relate to urban sprawl. Each of these agendas can be modified towards methods that could potentially constrain sprawl. Even so, the sustainable development of urban and rural areas is difficult to achieve. The problem lies in the fact that the gains (returns) and the costs are not addressing the same actors. Moreover, the gains of sustainable development are often abstract and lie in the future, while the costs are concrete, and are due in the present.

The sprawl of chaotic and uncoordinated urban land use is the largest single threat to sustainable peri-urban development. It can be characterised by a conflict between private interests and common goods (values). This involves the striving of individuals for improved environmental quality and for low rise residential housing that can only be satisfied at the expense of public goods, such as high quality green areas and clean air. This situation, well known in game theory as the "Tragedy of the Commons" (Hardin, 1968), is one type of market problem that can only be handled by public interventions.

To ensure sustainability in the rural-urban regions – especially in the peri-urban areas – land use changes and new developments have to be controlled, managed, or in some way coordinated by the public sector. Various means of such control are analysed in this chapter: through the formal government system and spatial planning policies; through financing and taxation systems and sectoral policies; with the help of regulatory tools; and finally, by using informal governance type processes (the latter are discussed in more detail in the final chapter of this synthesis report).

Potentials of government system and planning policies to control land use changes

In the market-dominated economies of Europe, spatial processes around large cities are largely determined by the population through choices of where to work and where to live. They are also determined by economic investors – the developers of industries, offices, retail units, or housing – through decisions of where to invest. The free-market logic of new development usually leads to urban sprawl, as residential choices and investment decisions are mainly based on short-term considerations, and do not take indirect consequences into account. In the calculations of the developers, peri-urban greenfield sites are preferred against the more problematic inner-city brownfield sites, since the external effects of development (e.g. growing travel times and car use) and the costs of creating public infrastructures (such as water, sewage and public transport) are usually not considered. There are of course exceptions, such as in the Scandinavian countries where these costs are normally included in the budget for a development project, and are typically shared between the developer and the public.

a) Typology of EU countries along their formal government systems and planning policies

The formal government systems and planning policies differ substantially across EU countries. In order to develop a typology based on the potential strength of control of the formal government system, unitary states (federal states were considered as a different category) were examined in more detail in terms of the following dimensions:

- How many intermediary levels exist;
- How strong these are (governmental elected by citizens, administrative with general competence, administrative with limited competence);
- To what extent are the local government units integrated.

Based on the relative power of the local and the subnational (regional) levels of government, the following typology emerged:

From table 9 it can be seen that the new member states are split between two categories. The Baltic States, Slovenia and Poland have relatively large local government units (category 3), while the other countries' decentralisation has led to a fragmented local government system where a new 'regional' level of government would be needed for coordination. This second category virtually does not exist in the EU-15.

Table 9: Typology of territorial governmental systems in the EU27+2 countries

Government structure	1. Classic unitary countries	2. Centralized unitary countries with strong, but non-integrated local authority level	3. Centralized unitary countries with strong, integrated* local authority level	4. Decentralized unitary countries with strong local and strong regional level	5. Regionalized unitary countries	6. Federal states
EU-15 and EFTA countries	Greece Ireland Luxembourg	Portugal	Denmark Finland The Netherlands Sweden Norway	France United Kingdom	Italy Spain	Austria Belgium Germany Switzerland
New Member States	Bulgaria Czech Republic Hungary Romania Slovakia Cyprus Malta	Estonia Latvia Lithuania Slovenia	Poland			

Based on Tosics-Dukes, 2005, with alterations based on ESPON 3.2

* In the integrated type, the size of local governmental units is larger, as it is determined by the supposed optimal size for the effective provision of public services. Examples are the Anglo-Saxon and Scandinavian systems. In the non-integrated administrative systems, preference is given to local autonomy over the aspect of service provision. Local governments are typically small (most settlements might have their own municipality), and integrative institutions are set up to ensure the coordination required for public services.

The typology has been used in PLUREL as a general framework for the further analysis of the government and planning dimensions. More detailed investigations are performed in selected countries which cover all the categories of the typology.

b) Government and planning in the rural-urban regions

The rural-urban regions cover large areas, generally beyond the limits of the city and even the functional urban area. Although different patterns can be found across European countries, usually no separate (supra-local level) administrative unit exists for this area, which consists of many local governments. Under such circumstances, the public control over the market processes in the peri-urban area can be ensured through special public administration arrangements (e.g. through the introduction or empowerment of a metropolitan government structure or through the creation of compulsory associations of lower level administrative units) and/or through planning policies that give control functions to higher level governments over the plans of the local governments in the rural-urban region area.

The interplay of the government system and the overarching planning policies shows the potential of the public role to manage and control peri-urban development. This can range from no management and control (fragmented public administration and laissez faire planning policies) to the maximum potential for control (strong upper level government arrangements and strong planning control covering the rural-urban region).

Based on the results of country reports prepared in the PLUREL project, the countries under investigation can be classified according to the two main dimensions of our analysis as follows (table 10).

According to table 11, the potential strength of public management and control over land use change (through the formal government system and planning policies) can be quantified in the following way.

Table 10: Classification of countries according to the rural-urban region level systems

Strengths of control from supra-local levels of the planning system	Size of the most important supra-local level (from land use change perspective)	Local level (average size of local governments, '000 population)	Countries
C) strong, controlled spatial policies	Large (>1M)	any	-
	Medium-sized (0.5-1M)	any	Portugal
	Small (<0.5M)	any	Cyprus, Greece, Lithuania
B) medium level of control	Large (>1M)	large (>30)	Denmark[1], The Netherlands, United Kingdom
		Medium-sized (10-30)	Belgium, France[2], Germany
		small (<10)	Italy, Spain
	Medium-sized (0.5-1M)	large (>30)	Ireland
		medium-sized (10-30)	
		small (<10)	Austria
	Small (<0.5M)	large (>30)	Sweden
		medium-sized (10-30)	Finland
		small (<10)	Estonia, Latvia, Luxemburg, Malta[3]
A) weak level of control	Any	large (>30)	Bulgaria
		medium-sized (10-30)	Poland, Slovenia
		small (<10)	Czech Republic, Hungary, Romania, Slovakia

1 The 2007 reform abolished in Denmark the regional authorities, thus the country is on the way to move down in the hierarchy, towards less public control. The same applies to the United Kingdom, with regard to the 2010 termination of the Regional Development Agencies.
2 While local governments in France are very fragmented, the Urban Communities cover most cities and their agglomerations.
3 For Luxemburg and Malta the results may be misleading due to the small size of the country.

Table 11: Strength of rural-urban region level public control over land use changes

Value	Countries
7	-
6	Denmark, The Netherlands, Portugal, United Kingdom
5	Belgium, Cyprus, France, Germany, Greece, Ireland, Lithuania
4	Italy, Spain, Sweden
3	Austria, Bulgaria, Finland
2	Estonia, Latvia, Luxembourg, Malta, Poland, Slovenia
1	Czech Republic, Hungary, Romania, Slovakia

High density urban forms restrict further growth of city centres

The rural-urban region level government and planning systems show the strongest potential public control over land use changes in the north western European countries, mostly because of their consolidated local government systems. On the other hand, southern European countries which show high potential, such as Cyprus, Greece or Portugal, have more fragmented local government systems, but stronger control by supra-local levels. Most new member states show a weak public control potential, with the notable exception of Lithuania (where the tradition of strong planning is based on the presence of the former western Soviet planning institutions) and Bulgaria (with a consolidated local government system).

The results indicate the strength of public control in the different countries through the national government and planning systems. However, these values do not show the real strength of the public control over land use change, as in practice these powers can be implemented in different ways. Thus these values should only be seen as a potential resulting from the higher level government and planning systems. Hypothetically, a weak potential control is hard to overcome even if the willingness of the local partners is given, while a high potential may or may not be used entirely, depending on the intentions of the public bodies in power in the rural-urban region.

A more detailed analysis would highlight the developing complex multilevel governance and spatial planning practices. For example, in France the SCOT planning system ensures a relatively high level of public control. The UK practice was quite complex. The national government provided legal powers and guidance, the regional government coordinated and allocated housing quotas and infrastructure, while the local government, in two tiers, made local 'development frameworks' and managed local decisions. This system is currently being altered.

Financial, regulatory and policy instruments for efficient public control over peri-urban development

The formal government system and planning policies assign the framework and the potential level of public management and control over market processes. Within this, the real strength of public control depends on specific factors influencing the motivations of the government actors towards the processes in the rural-urban region area:

- The local government financing system (from where and according to which parameters the local governments receive their revenues, and what are the spatial consequences);
- The taxation system (the different types of taxes local governments are allowed to levy, and the spatially relevant consequences of these taxes);
- Sectoral (infrastructure, economic development, transport and housing) policies and subsidy systems.

Among the regulatory tools, the public sector has to steer the land development process. The following deserve most attention:

Central business district, The Hague, the Netherlands, a PLUREL case study

- Regulations applied on new land use changes and developments in general, such as sectoral requirements attached to permitting larger developments (balance between jobs and homes, transport services, physical and social infrastructure requirements) and financial regulations, such as taxes on green field investments and subsidies for brownfield redevelopment;
- Rules applied in the case of concrete decisions on larger land developments. Possibilities for the public sector to recapture some part of land value increase and require contribution from the private developer for infrastructure development when the rezoning of land is allowed, or at the moment when building permission has to be issued for the planned project.

The analysis of these factors requires more detailed investigations, which could only be performed for a limited number of countries (covering all categories

Table 12: Quantified answers by the regions

	Haaglanden	Manchester	Montpellier	Leipzig	Koper	Warsaw	Thessaloniki	Budapest	Bologna
Financial transfer system	0.67	1.00	0.67	0.67	0.00	0.33	0.00	0.33	0.67
The local taxation system	0.67	0.67	0.67	0.33	1.00	0.67	0.67	0.33	1.00
Local government financing systems	**0.67**	**0.83**	**0.67**	**0.50**	**0.50**	**0.50**	**0.33**	**0.33**	**0.83**
Economic development and infrastructure	1.00	0.50	0.50	1.00	0.50	1.00	1.00	0.50	0.00
Transport	0.83	0.67	0.50	0.50	0.17	0.33	0.67	0.50	0.50
Housing	1.00	0.67	0.67	0.33	0.33	0.33	0.33	0.00	0.33
Sectoral policies	**0.94**	**0.61**	**0.56**	**0.61**	**0.33**	**0.56**	**0.67**	**0.33**	**0.28**
Tools to steer development	**0.75**	**0.50**	**0.50**	**0.75**	**1.00**	**0.25**	**1.00**	**0.25**	**0.50**

of the government typology) represented by the administrative regions. The information gained from selected regions through a questionnaire has been quantified, with the following results. Higher values mean less interest/motivation for urban sprawl and/or more public control over it (Table 12).

The results can be summarised and evaluated along the three main topics of analysis (the rows in bold) in the following way.

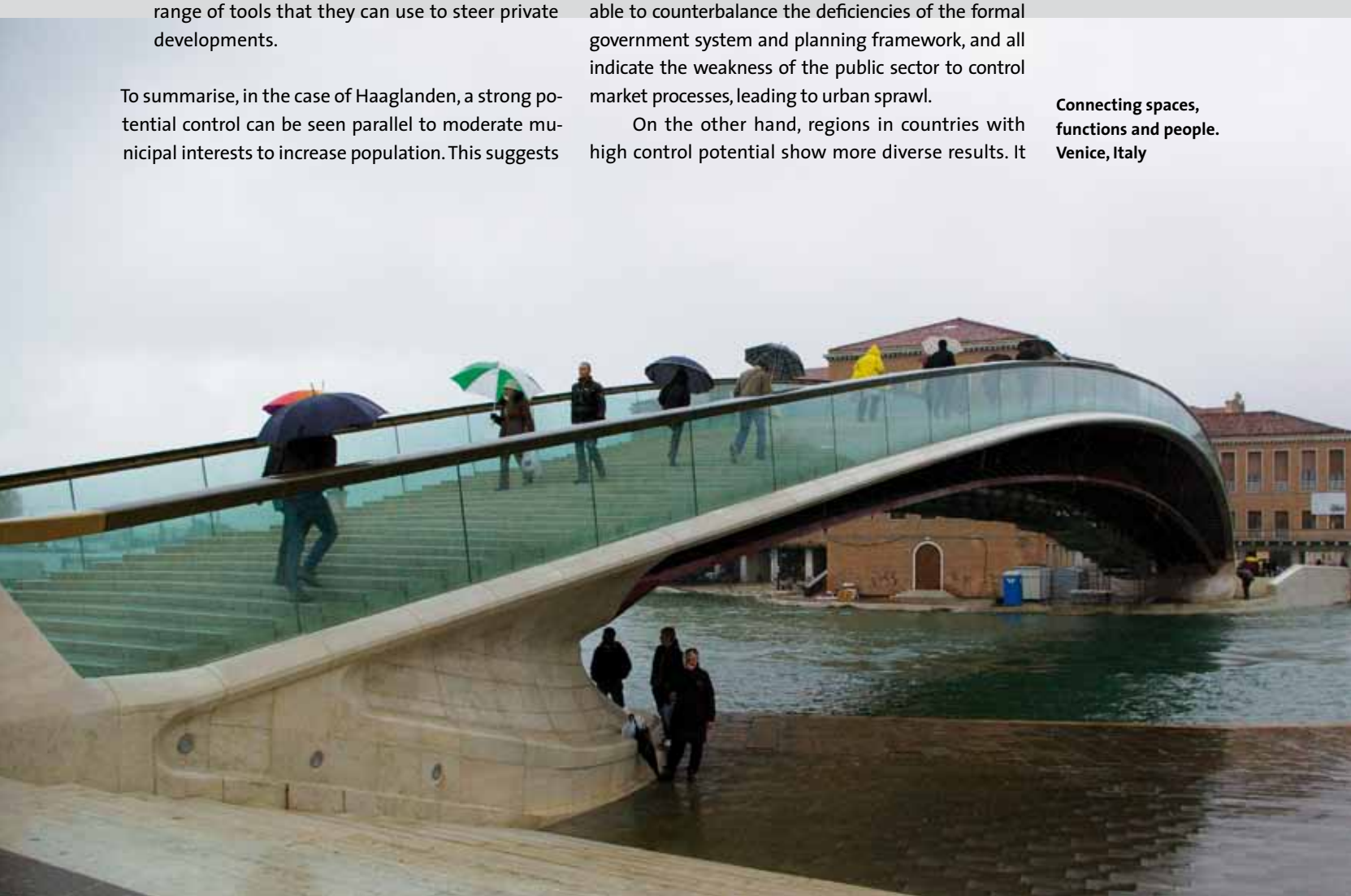
- Regarding the **local government financing system** in some regions (Haaglanden, Manchester, Montpellier and Bologna), the system does not directly motivate the municipalities to increase their population. On the other hand, in other regions (Leipzig, Koper, Warsaw, Budapest and Thessaloniki) such motivations are created by the financing system.
- Regarding **sectoral policies**, Haaglanden stands out, since very few of its analysed policies have a sprawl-oriented territorial impact.
- Regarding the **regulatory tools**, in some regions (Koper, Thessaloniki, Haaglanden and Leipzig) the municipalities are equipped with a broad range of tools that they can use to steer private developments.

To summarise, in the case of Haaglanden, a strong potential control can be seen parallel to moderate municipal interests to increase population. This suggests a high probability for a more effective level of control over peri-urban land use. Manchester, Montpellier, Leipzig and Bologna seem to be in a less favourable, but still manageable, situation.

Thessaloniki and Koper show a potentially strong hierarchical government and planning system, while the municipalities are strongly interested in expansion, which can lead to conflicts in the land use decisions. Warsaw and Budapest have a much weaker government and planning framework. These municipalities are interested in expanding urban land use, and most sectoral policies also lead in this direction. In these regions, the public control over land use does not seem to be efficient.

When comparing the results of the previous two analyses, a relatively strong connection can be seen between the national and regional levels of analysis. In countries with weak institutional and planning systems, the regions face financial and sectoral policies which usually create favourable conditions towards urban sprawl. At the same time, local authorities in these regions (with the notable exception of Koper, Slovenia) have only very limited tools to control urban sprawl. Thus the public financial and sectoral policies are not able to counterbalance the deficiencies of the formal government system and planning framework, and all indicate the weakness of the public sector to control market processes, leading to urban sprawl.

On the other hand, regions in countries with high control potential show more diverse results. It



Connecting spaces, functions and people. Venice, Italy

is in Haaglanden, Manchester and Montpellier that the potential for strong control given by the formal government and planning systems seems to be fulfilled by financial policy and regulatory measures. In other regions, the regulations and tools do not seem to fully match the potential these regions could have in controlling peri-urban development.

The governance aspects of developing public control over peri-urban areas

The application of public control over the key aspects of sustainable development has to be taken in a collaborative way as much as possible, with the inclusion of all stakeholders. There is a growing recognition that the increasingly complex task of steering land use developments can no longer be handled exclusively by government actors.

This means a shift towards new forms of governance, beginning cooperation between governments and other parties to advance sustainable land use planning, providing relevant information and capacity building to the civil society, and better handling of the complex issues related to sustainability by the government (Evans et al., 2004).

The peri-urban area generally falls under subregional or regional authority bodies. Many different interests interfere, both urban and rural, which are held by different urban and rural organisations. These can be businesses, such as developers and farmers, but also residents associations, associations of owners (CSOs) or nature NGOs. Considering this interference of different interests in the urban fringe that are held by different interest groups (stakeholders) of state, market and civil society, the governance paradigm and the policy network approach is the most appropriate for studying their interactions to steer developments in the urban fringe. This approach considers public policy making and governance taking place in networks consisting of various actors.

A more detailed analysis in the PLUREL case study regions has shown that the governance processes can only be effective if they are based on a solid formal government and planning system. Without this, they only have very little potential to modify the strength of control over market processes in peri-urban areas. Governance procedures – the agreements between local governments in policies or regulations that would not be compulsory according to the formal systems – can be very important, but it is unlikely that such agreements can be reached without the strong backing of the formal government institutions and the financial and regulatory processes.

Thus the correct setup of the formal institutional systems, policies and regulations is of prime importance to fight urban sprawl. Governance processes can become useful extensions, but cannot substitute for the non-performance of the formal institutions and policies in rural-urban regions.

At the urban periphery of Frankfurt/Main, Germany

Socialist satellite town. Bratislava, Slovakia

Conclusions

The results of the government and governance analysis underpin the hypothesis raised at the end of the first section – that a weak level of potential control by the formal government and planning systems over market processes is hard to overcome by regulations and policies (even if the willingness exists among the public actors) or by bottom-up governance policies. On the other hand, a high potential level for control by the formal systems may or may not be used entirely, depending on the intentions of the public bodies in power. In the case of a strong formal framework, the role of governance relationships might be larger to achieve changes towards more sustainable development.

The government and governance analysis explored two extreme types of countries from the perspective of public control over urban sprawl processes in peri-urban areas. On the one hand, there are a few countries (e.g. the Netherlands, France, UK and the Scandinavian countries) where the potentially strong control assured by the formal government system and planning policies over rural-urban region processes are underpinned by the regulatory tools and planning policies used in practice by regional and local governments. These countries have good chances to control peri-urban developments – especially if informal governance agreements can also be reached among the partners.

The other extreme group consists mainly of the new EU member states from eastern central Europe, where the formal government system and planning policies are weak and do not allow sufficient control over the rural-urban region processes. In these countries, neither the practically used regulatory tools and planning policies, nor governance processes can assure such a control. The public sector is therefore weak in all aspects to control peri-urban development. In these countries, the outcome can be accelerating urban sprawl, depending on the specific market factors.

The government and governance analysis highlighted the importance of effective formal institutions, policies and regulations at the rural-urban region level, especially targeted at the peri-urban areas. The third chapter of this status report proposes some hypothetical models as to how the European level could contribute to the strengthening of these basic elements of the public control over peri-urban sprawl. European level initiatives would be important to achieve the integration of smart, sustainable and inclusive aspects of urban development, which is very much required to implement the EUROPE 2020 strategy (CEC2010a).

EUROPEAN

PLUREL

POLICY AGENDAS

Cohesion Policies

The targeting of territorial cohesion and regional policy programmes involves taking more into account the urban-rural relationship and the specific role of peri-urban areas. PLUREL results underline the fact that within the territorial borders of eligibility regions, regional differences on a smaller scale are considerable.

What are the aims of Territorial Cohesion and regional policy?

Territorial cohesion and regional policy seeks to reduce economic and social disparities within the EU-27, and particularly addresses the less-favoured member states and regions. Tailored to the needs and potentials of the latter, programmes are co-financed by the Structural and Cohesion Funds, and support balanced growth and job creation. Through an integrated approach, these programmes strengthen sustainable development of the regions and of the EU territory as a whole. The funding principle builds on support of single projects with a strongly integrated character.

The European Fund for Regional Development (EFRD), the European Social Fund (ESF) and the Cohe-

sion Fund form the support platform and contribute to three objectives: Convergence, Regional Competitiveness and Employment. The eligibility of projects depends on whether programmes are designed for regions under the "Convergence", "Regional Competitiveness and Employment" or "Territorial Cooperation" objectives. Accordingly, territorial cohesion and regional policy allows for objective-oriented implementation in defined target areas.

Are peri-urban areas a topic for Territorial Cohesion policy?

The structural funds **operate simultaneously** in rural and urban areas. Therefore, peri-urban areas are also covered. According to EC statistics (Table 13), the distribution of funds available for the Cohesion Policy 2007 – 2013, according to the type of area, is rd. 30% for urban areas and less than 20% for rural areas.

The analytical procedures developed and applied in PLUREL allow for a more specific analysis of peri-urban regions in this context. Figure 40 shows regions with an above EU-27 average of peri-urban share within the NUTSX borders, which are recipients of the different types of structural funds. In Convergence regions (e.g. Poland, Hungary, eastern Germany, northern Portugal and southern Italy) as well as in Competitive and Employment regions (England, Benelux, south west Germany, Italy and French coastal regions) there are many regions that have to deal with the typical problems of peri-urbanisation.

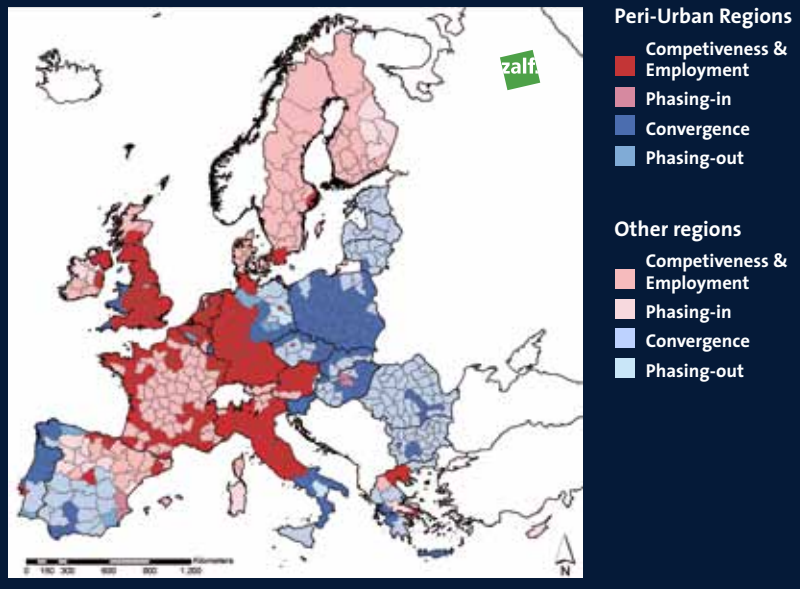
Table 13: Indicative distribution of structural funds by type of area (in millions of Euros) in 2007-2013 (COM 2010b, adapted)

	AREAS		
	ERDF	ESF	TOTAL Structural funds
Rural areas	47,127	6,545	53,672
Sparsely or very sparsely populated areas	7,860	3	7,863
Highlands	6,037	344	6,381
Islands	3,916	281	4,197
Outermost regions	1,031	1,188	5,399
Territorial co-operation areas (between several regions/countries)	9,441	162	9,604
Urban areas	99,261	9,706	108,967
Not applicable	90,509	57,844	148,353
Total	268,361	76,073	344,435
% strictly rural areas	17.6%	8.6%	15.6 %
% rural areas (widest possible definition)	22.7%	9.1%	19.7 %
% urban areas	37.0%	12.8%	31.6 %

Within the EU-27, one region in four has a GDP (Gross Domestic Product) per inhabitant under 75% of the EU-27 average. At the regional level, the difference is even greater. The richest region is Inner London with 290% of the EU-27's per-capita income, while the poorest region is North-East in Romania with 23% of the EU average. In the period 2007 – 2013, cohesion policy will benefit from 35.7% of the total EU budget or 347.41 billion Euros. Division by objective is rd.

- 81.5% for Convergence
- 16% for Regional Competitiveness and Employment
- 2.5% for European Territorial Cooperation (CEC 2010b)

Figure 40: Cohesion Policy in Peri-Urban Regions 2007 – 2013



Source: European Commission, AIT, ZALF

What are the new challenges of Territorial Cohesion?

Business park development in the outskirts of Warsaw, Poland

The main task of regional policies in the coming years will be to "provide the appropriate framework for integrated solutions meeting the goals of the Europe 2020 Strategy:

- Smart growth – developing an economy based upon knowledge and innovation;
- Sustainable growth – promoting a more resource-efficient, greener and more competitive economy;
- Inclusive growth – fostering a high-employment economy delivering social and territorial cohesion" (Ahner, 2010).

Cities are the motor that drive regional growth, and are the key to increasing the EU's competitiveness worldwide. 70% of EU inhabitants are city dwellers, yet there is no specific EU policy for urban development. In the 2007 – 2013 programming period, the urban development dimension has been expanded. The increase in funding from 0.4% to 3% of the total allocation has helped boost urban development. Projects that specifically improve innovation performance and create a competitive, connected and greener economy have been selected (CEC, 2010e).

Does the peri-urban situation bring along additional challenges?

One of the main products of the EU project PLUREL research is a multiple scale and multiple purpose tool for the integrated Impact Analysis (iIAT-EU) of urbanisation trends on land use functions (for more details see the Annex). The iIAT-EU integrates all quantitative modelling results at EU-27 scale into one surface (Piorr et al., 2011, Haase et al., 2010). It permits the free selection of indicators (which here are related to indicators relevant for the "new challenges" of Territorial Cohesion), and for making comparisons between single states, single NUTSX regions, or groups of similar regions, aggregated by a typology of choice.

The analysis in figure 41 shows that Competitiveness and Employment Regions, such as those with a high peri-urban share, do not differ distinctly from urban regions except for their lower GDP per capita and stronger social individualisation trends. On the other hand, Competitiveness regions with a strong rural character show clear disadvantages in the employment of the service sector, but only slightly more ageing, less soil sealing, landscape fragmentation and more natural habitats.

In Convergence regions, peri-urban areas are the regions of change (figure 42). Urban, peri-urban and rural regions vary in most indicators, and peri-urban regions take an intermediate position in employment in all sectors. Peri-urban regions prove particularly young, but not socially exclusive, and possess the highest GDP per capita.

Figure 41: Situation in 2000, Competitiveness regions
green: predominantly urban, blue: predominantly peri-urban, red: predominantly rural regions

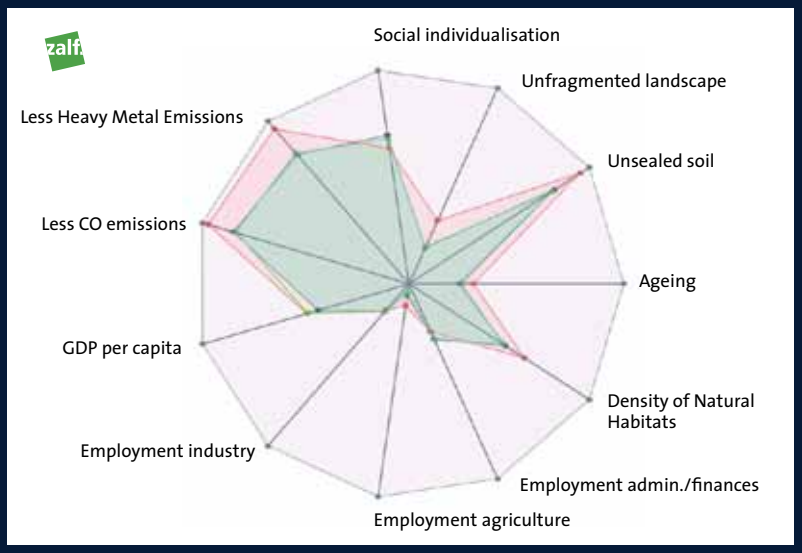
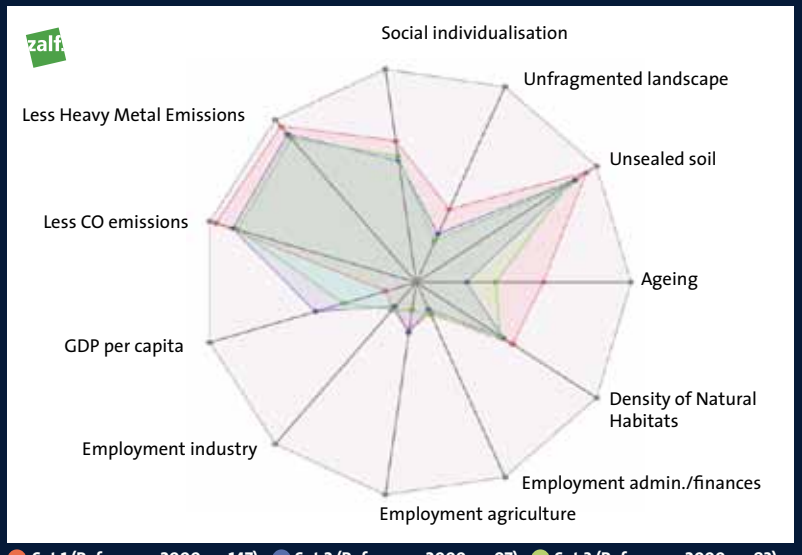


Figure 42: Situation in 2000, Convergence regions
green: predominantly urban, blue: predominantly peri-urban, red: predominantly rural regions



The potential of the peri-urban in meeting the new challenges

Figures 43 and 44 present, based on modelling results, a look into a Hypertech future of the peri-urban Competitiveness regions respective of Convergence regions. Ageing, social individualisation and GDP per capita are, in both cases, the indicators that develop most dynamically. In peri-urban Competitiveness regions, the trend shows continuously increasing values, with ageing becoming a greater problem after 2015. Trends are similar in peri-urban Convergence regions, with the exception of social individualisation. After a rapidly developed peak in 2015, the trend will reverse. GDP per capita will develop slightly faster, but will reach its limit at a lower overall level. The strongest differences appear in the employment situation in the third and fourth sectors (of services and administration) in Competitiveness regions. Soil sealing and the loss of natural habitats are developments that need to be kept track of in peri-urban Competitiveness regions, while in Convergence regions, efforts should be taken to set incentives to maintain employment in agriculture in the peri-urban, as this factor contributes positively to unfragmented landscapes and related ecosystem services.

Nonetheless, regions differ a great deal from each other. Figure 45 compares the average situation of peri-urban regions in Poland with two single NUTSX regions that also have an above average share of peri-urban area. The positive development of the GDP in all three cases will be reached from different sectors. Accordingly, social and environmental impact indicators differ substantially, and shed light on the potential risks and development objectives to be set at a regional level. The PLUREL iIAT aims at supporting regional stakeholders and policymakers in the steering process by delivering research-based information necessary for strategic objective setting.

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Figure 43: Peri-urban Competitiveness regions
green: baseline year 2000, blue: Hypertech scenario A1 year 2015, red: Hypertech scenario A1 year 2025

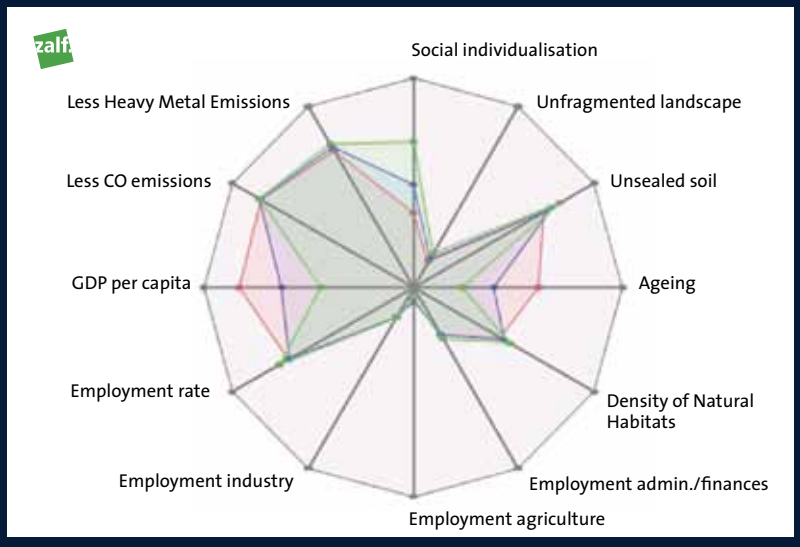


Figure 44: Peri-urban Convergence regions
green: baseline year 2000, blue: Hypertech scenario A1 year 2015, red: Hypertech scenario A1 year 2025

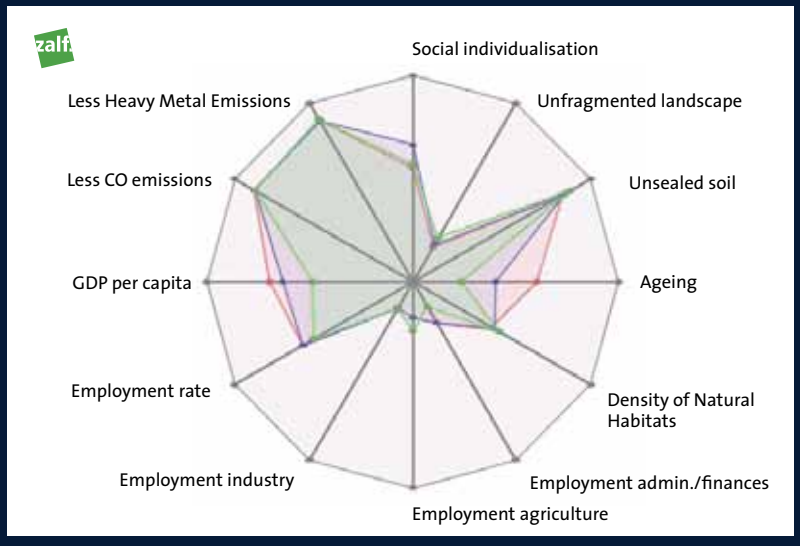
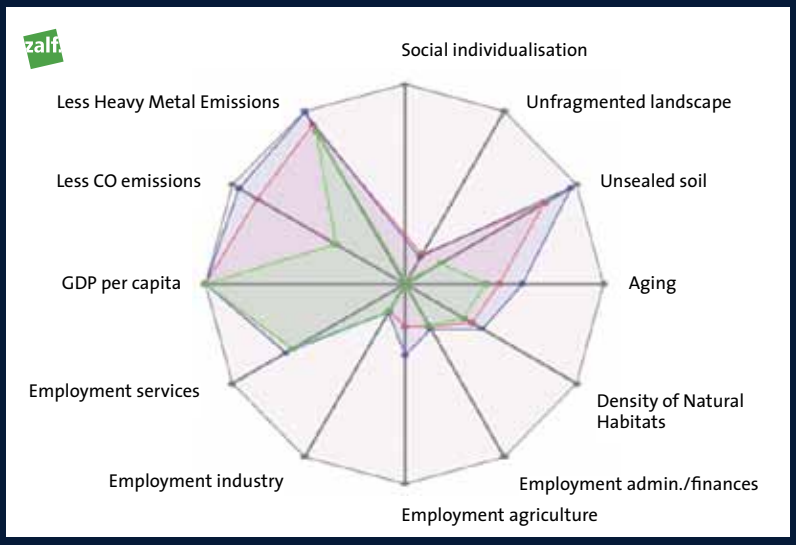


Figure 45: Peri-urban POLAND in a hypertech scenario A1 year 2025
red: all NUTSX regions in Poland with above average share of peri-urban area, blue: NUTSX region Lodzki, green: NUTSX region Gdansk-Gdynia-Sopot



Source: ZALF, AIT, PAS

View over Warsaw, Poland, a PLUREL case study

How to best exploit peri-urban potentials

In the future, territorial cohesion policy will increasingly build upon good governance and local empowerment. Programme design and selection criteria for projects will become more targeted if they take the urban-rural relationship and the specific role of peri-urban areas more into account. The PLUREL iIAT-EU, for example, can contribute to interdisciplinary discussion of regional situations and possible trends. Hence, it helps to support participatory decision processes of policy makers and stakeholders in ranking objectives and priorities. PLUREL results underline the fact that within the territorial borders covering eligibility regions, the differences between regions are great.

Targeting regional programmes means that appropriate projects are tailored for the specific situation. For example, some regions might display very obvious disparities that require support for economic, environmental or social sustainability objectives. Other regions perhaps possess a rather mixed problem situation that calls for a different approach. The goal of improved policy targeting is to meet the regional development vision of EU-27 after 2013: smart, sustainable and inclusive growth.

Agricultural and Rural Development Policies

If key steps are taken, future CAP has the potential to replace the sprawl of artificial surfaces from the peri-urban into rural land areas with diversity of technical, social and environmental innovation. In addition, greater biodiversity protection and resilience in resource-use can be achieved based on powerful urban-rural cooperation tailored to regional demands.

What are the aims of the Common Agricultural Policy (CAP)?

On average, more than 20% of the income of European farmers comes from payments received from the EU. The existing Common Agricultural Policy (CAP) provides a package of measures and policies divided into three main types: market expenditure, direct aids and rural development. For decades, the CAP had been mainly oriented towards market support, and expended direct payments for increased market production. Also in the future, direct support (the first pillar of the CAP) will provide a reasonable level of income for farmers facing volatile market conditions or disasters. With improved technologies, environmental awareness and changed consumer demands, the CAP has been decoupling payments from production since 2003, and aims for the stronger support of Rural Development (RD) measures (the second pillar of the CAP). A general trend towards extensification of agriculture is the result. This trend should be particularly strengthened in areas of high environmental, landscape and recreational value, while in prime agricultural areas, the CAP should seek to set incentives for developing farms towards better competitiveness on global markets. The respective policy instruments of the CAP are the Rural Development (RD) Programmes, funded by the European Agricultural Fund for Rural Development (EAFRD) for the period 2007 – 2013. Member states are free to distribute the funds within certain budget shares to four thematic axes that support those measures that best reinforce the development objectives of their region. These include measures to improve competitiveness, agri-environmental measures, diversification measures, and LEADER. The rationale is to best exploit the potentials of target groups and target regions.

Figures on the CAP

The average proportion of EU payments and national aid in total farm receipts stood at 16% for EU-25 in 2006 (CEC 2009a). Rural Development (RD) support in the EU-25 corresponds on average Euro 61/ha (EU and national part). The total direct support received by RD recipients corresponds to 60% of their Farm Net Value Added (FNVA). In comparison, the direct support received by non-recipients is only 26% of their FNVA (CEC 2009b).

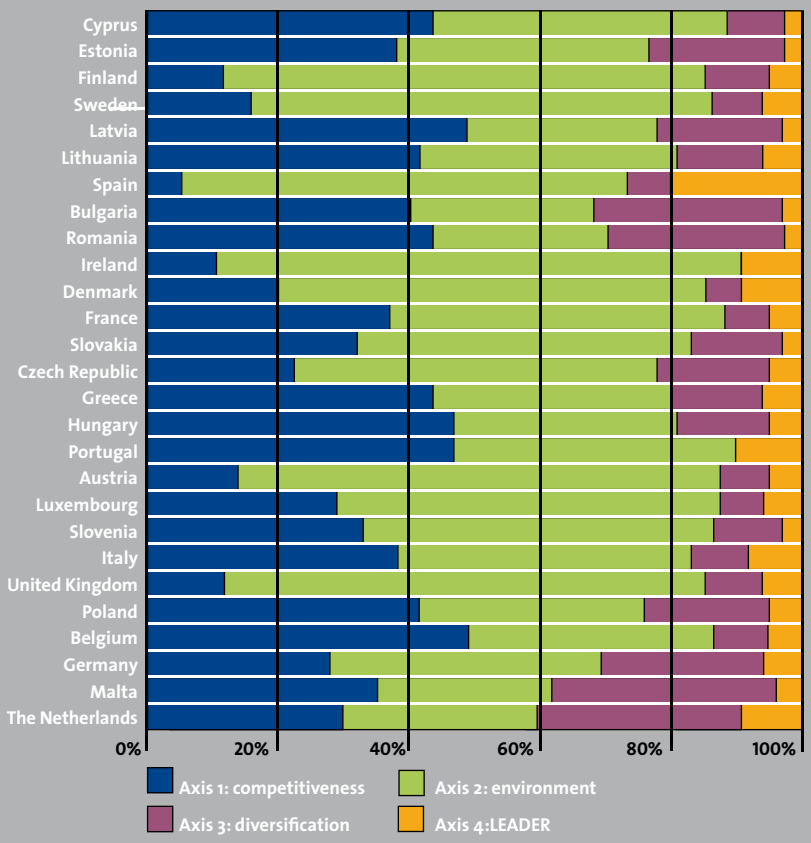
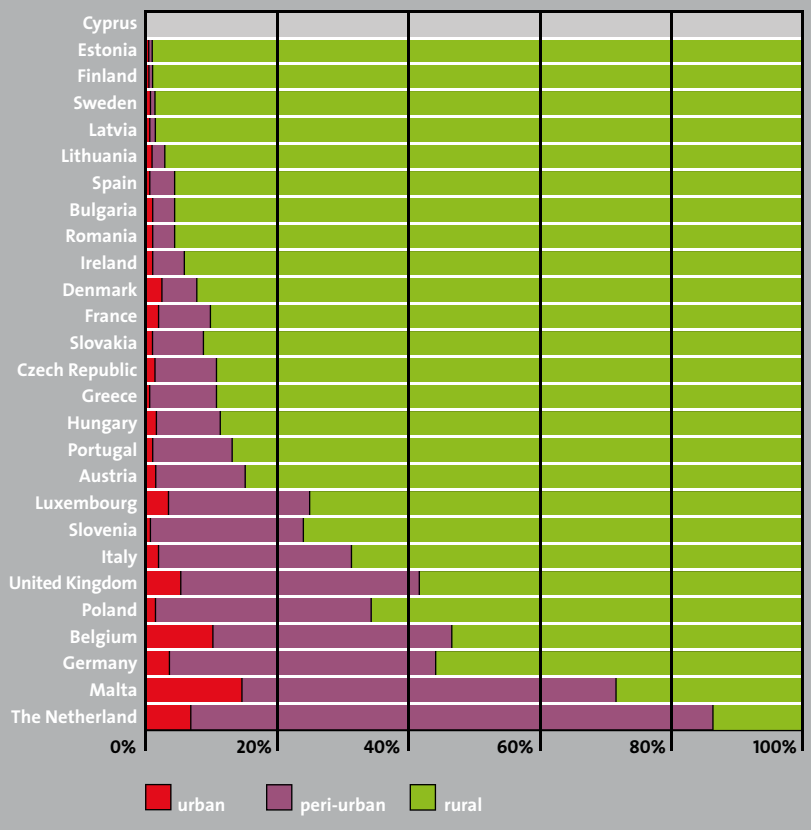


Figure 46: Rural Development budgets and RUR composition by Member State

Share of EAFRD contribution per Member State, Programming period 2007-2013 (EC, August 2008)



Share of EAFRD predominantly urban, peri-urban and rural regions

Are peri-urban areas a topic for the CAP after 2013?

Until now, in the context of the CAP, the discussion about the specific role, potentials, needs and targets of peri-urban regions has only been held sporadically. A considerable share of public support from the first pillar has gone towards urban and peri-urban regions, as they are the location of head offices of big companies owning farmland. However, this does not mean that recipients keep the money in the urban regions. Cash flows are directed further to the countryside where the farmland is located, e.g. with farm investments. In contrast, recipients of second pillar payments are nearly exclusively located in rural regions. Currently, rural development policy (the second pillar) is clearly directed towards the support of rural regions, where average income per capita is lower than in towns and cities, the skills base narrower, and the service sector is less developed. Still, the more concisely the needs for the post-2013 programming period of the RD Programmes are formulated, the clearer the need becomes to address specific importance to the particularity of farms providing public goods in the urban rural interface.

PLUREL research results permit the comparison of CAP support distribution to the thematic axis of RDPs with the share of peri-urban areas for single regions or groups of regions at different levels of aggregation, e.g. according to typologies. Figure 46 shows this for the national scale. Countries with a high share of peri-urban regions tend to spend a higher share of the RD budget for diversification measures and agri-environmental measures than predominantly rural countries.

Until now, the evaluation of CAP payments has been carried out in a way that does not allow for specific consideration of the impacts on peri-urban regions. The methods developed in PLUREL would allow for spatially explicit impact assessment if beneficiary data with georeference (IACS/ LPIS) were accessible. It would then be possible to answer questions such as the following:

- Which behavioural patterns of farmers as providers of rural goods and services are typical in peri-urban regions;
- How is the relationship between societal urban demand and agricultural land use related to the multiple supply of functions and services in peri-urban areas;
- In which direction is this relationship expected to develop under the changed pressure situations?

The intervention logic of LEADER excludes larger cities from eligibility. PLUREL results cannot prove a competitive advantage or substantially different farm structure near larger cities.

LEADER, the fourth axis of RDPs, supports projects, not measures or farms. "LEADER enables inclusive partnerships with urban settlements of a certain size, particularly the small market towns that are an integral part of rural areas. The size of urban centres included may be as high as 30,000 inhabitants, depending on the member state" (Dormal-Marino, 2009). The reasoning for this threshold is the intervention logic aimed at levelling disparities between rural and urbanised areas.

It is important to note that analyses of PLUREL do not prove that farms in rural regions have strong disadvantages or noticeably different characteristics and conditions than farms near large urban centres. The figures 47-50 show the results of an analysis of NUTS3 EUROSTAT census data, related to a typology of urban-rural regions that takes settlement structure and population density into account.

- Near Metropolitan regions in Europe, the share of specialists in horticulture is higher than in regions with less urbanisation (Figure 47);
- Approximately 70 percent of European farms have arable production, rather independent of whether they are located in metropolitan regions, rural regions or intermediate urbanisation structures. However, rural regions show a broad range due to more grassland use (Figure 48);
- Full time farming tends to be slightly higher the more urbanised regions are. Pluriactivity (diversification into other sectors) is often positively connected to multifunctionality. On the other hand, the share of farms with full time employment in rural regions is not higher than in the other settlement types analysed (Figure 49);
- The economic performance (measured by the gross margin) is higher in farms located near metropolitan areas due to higher specialisation. Regions with large urban centres are comparably lagging behind (Figure 50);

Space for recreation: an organically run agricultural landscape. Brodowin, Germany

Figure 47: Horticultural farms in rural-urban regions

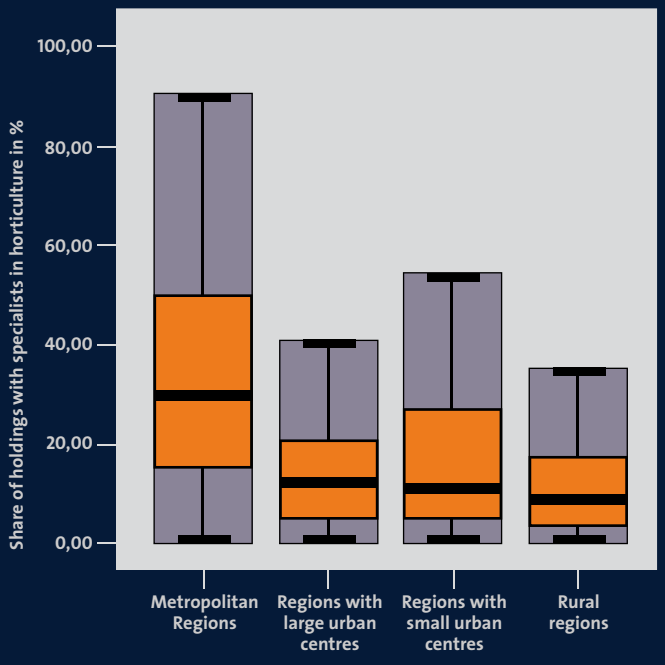


Figure 48: Arable farms in rural-urban regions

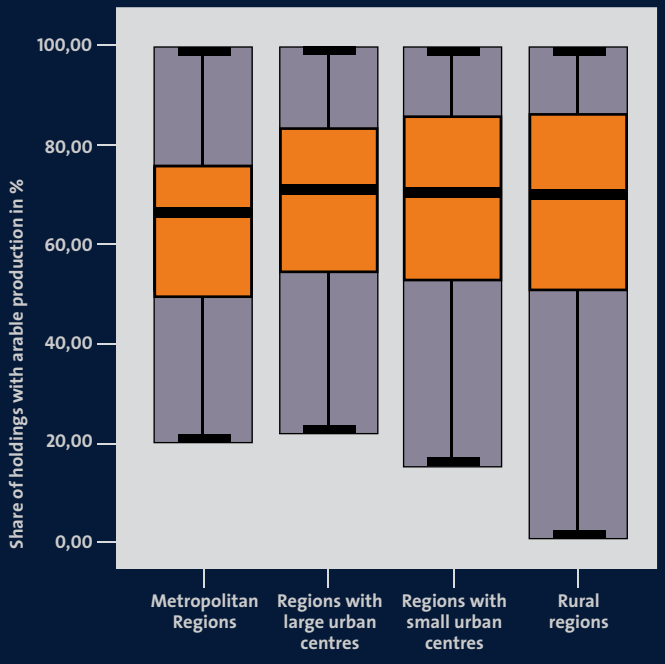


Figure 49: Part-time farmers in rural-urban regions

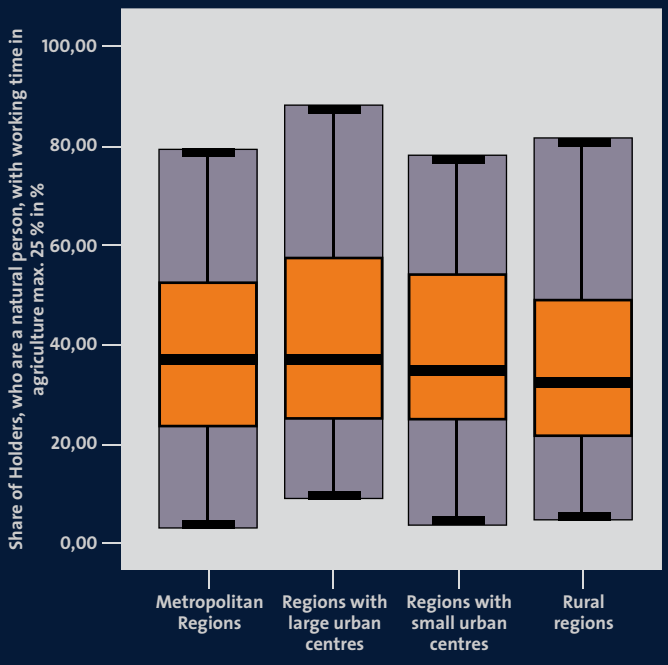
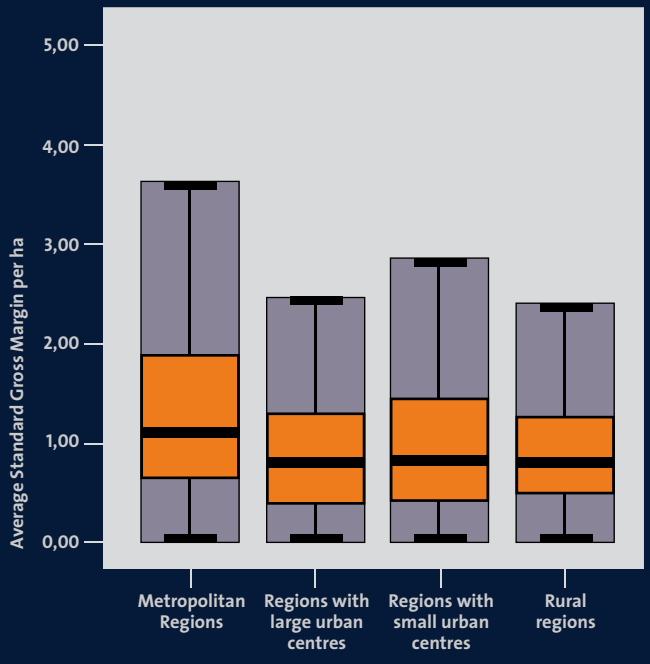


Figure 50: Farm economy in rural-urban regions



Why are peri-urban areas important to meet the new challenges of the CAP?

In recent years, European agriculture has had to learn how quickly global trends can harm its economic and environmental stability. Reaching better resilience is therefore the new challenge for sustainable Rural Development. In particular, climate change, renewable energy, water management, biodiversity and dairy restructuring are the main new issues the CAP agenda must address.

Maintaining peri-urban agriculture is an essential strategy in mitigating climate change (see next chapter "Towards Europe 2020") by buffering temperature, precipitation and dust effects, and thereby improving the health of citizens. Furthermore, peri-urban agriculture contributes to the goal of reducing CO_2 emissions (e.g. by maintaining open spaces and agricultural use, by reforestation programmes, the processing of biomass, and the promotion of the localisation of quality production and consumption to reduce food miles), and also by developing short local food chains that reduce health costs and connect the activity of buying local food with recreation.

Peri-urban agriculture is also essential for the supply, storage and purification of water within a short distance to centres, and for the maintenance of biodiversity. Both functions are related to the spatial extent and spatial pattern that agriculture maintains in the urban fringe. The more that agriculturally managed open space is reduced and fragmented, the more an efficient functioning of the natural resilience capacity is curtailed. If RD Programmes seek to strengthen rural sustainability, they should best exploit rural-urban relationships. A clearer acknowledgement of peri-urban functions is therefore urgently required.

The CAP towards 2020

The EU launched a public debate on the CAP post-2013, which indicated a significant demand to facilitate more regional differentiation in interventions with an improved territorial targeting, e.g. by differentiating peri-urban areas and isolated rural areas. Many stakeholders pointed out that the dependence of rural regions on neighbouring urban areas is a key determinant in achieving local development and the resulting need to reinforce urban-rural linkages (CEC 2010d).

With Rural Development support, the CAP after 2013 will contribute towards the balanced territorial development of rural areas throughout the EU by empowering people in local areas, improving local conditions, and building capacity and links between rural and urban areas. Under the guiding themes environment, climate change and innovation, policy measures will pay attention to innovative ideas for business, local development and local governance, e.g. by adding value to local resources, developing direct sales and local markets (CEC 2010c).

The CAP towards 2020 seeks to further strengthen the coherence between rural development policy and other EU policies, as well as a common strategic framework for EU funds. The European Commission presented three possible pathways for future CAP options: a rather conservative first option, a second option aimed at achieving more targeted measures, and most far reaching, a third option that would provide a clear financial focus on environmental and climate change issues through the Rural Development policy framework, which would encourage the creation of regional strategies in order to assure the implementation of EU objectives (CEC 2010c). The next chapters of this status report intend to present new approaches related to the third path discussed for the CAP post-2013.

Glasshouses in Haaglanden, the Netherlands, a PLUREL case study

Harvesting food and appreciation: 'Nomadic green' urban gardening. Berlin, Germany

How to best exploit peri-urban potentials without creating a distortion of competition for remote rural regions?

- The more that future support of agriculture is directed towards support schemes that are not only based on historic entitlements, but also on output criteria related to the societal legitimacy, the higher the probability that public and private payments for ecosystem services can be realised.
- Greening of the CAP should consider the potentials of peri-urban areas.
- More regionally targeted CAP measures in a rural-urban context are needed. This includes more flexibility on the entitlements, and for setting payments related to target groups or target areas.
- The more rural-urban relationships illustrate the role of the peri-urban in meeting sustainable development, the more effective governance processes will strive to control sprawl on-site, on time and in a well-communicated way. Vitality of rural areas will grow.
- The specific challenge for peri-urban regions lies in setting appropriate incentives for farmers to continue farming. In prime agricultural areas, this can be highly priced products, such as organically grown vegetables and niche products. For such farmers, it is important to ensure long term stability in land rental contracts. RD programmes can set incentives within axis 1 by offering specific investment support qualification and training opportunities for young farmers.
- A stronger integration of urban and rural actors within LEADER projects would be important, independent of where particular LEADER actions take place. The role of institutional interaction is an important issue in this context. Governance processes to negotiate land use demands in peri-urban landscapes towards sustainable decision making arise particularly within local action groups of LEADER projects. The CAP should not generally redefine thresholds, but should allow for regional and local target setting.

Transport Policies

Peri-urban key challenges for transport policies are to promote sustainable accessibility and a modal shift to more environmentally friendly mobility. These goals require a broad range of policy tools, innovative solutions and integrated and accessibility-oriented planning at all levels.

Aims of the EU transport policy

EU policy objectives for sustainable transport outline the need for a transport system that meets society's economic, social and environmental needs. Accessibility is crucial for regional competitiveness, employment and cohesion. In the peri-urban perspective, accessibility, and thus transportation, is the key issue when considering the linkages between urban and rural. In urban regions, cities themselves – instead of the EU – are actively considering transport policy. Cities and countries have active sustainable transportation policies, but local transport-related problems are also part of global-scale problems like climate change. Therefore, the EU has taken an active role in promoting cooperation and coordination in urban mobility at the European level in order to push development in the right direction at all levels: local, regional, national and European (Green paper for urban mobility (CEC 2007)).

Shipping of cars to new markets. Danube river, Austria

The peri-urban role

Peri-urban transport and mobility relates primarily to the locally decided and implemented urban policies, particularly including transportation and land use policies. In order to avoid the negative impacts of urban sprawl, peri-urban transportation and land use issues should be integrated with the urban policies that concern the whole functional area. As a result, there is the potential to increase sustainable accessibility in peri-urban areas. Sustainable accessibility refers to high quality accessibility with different modes of transportation, instead of car dependency.

Future transport policy challenges

Transport infrastructure has a major impact on future mobility in Europe. The infrastructure development should promote the sustainable accessibility and modal shift to more environmentally friendly mobility. The regional impacts of national and EU level transport policies and structural funds have to be recognised. Are investments into the infrastructure development directed towards supporting motorways or high speed rail connections? Which modes of transport are subsidised? What are new and emerging technologies, and what kind of infrastructure is needed in the future?

The potential of the peri-urban in meeting the challenges

In order to make the peri-urban issue broadly visible in the EU agenda, the spatial aspect should be emphasised in the policies. This concerns not only structural funds, but also functional urban regions. Policies should recognise the spatial dimensions and variety of functions in different parts of diverse urban regions (see chapter Peri-Urban Agendas – Transportation and commuting).

It has been acknowledged in the mid-term review of the EC's 2001 Transport white paper, that European sustainable mobility policy requires a broad range of policy tools which should aim towards a modal shift, optimised transport modes and co-modality. This adaptation especially concerns long distance travel, urban areas and congested traffic corridors. Co-modality refers to the efficient use of different modes in themselves and in combination with others. In the peri-urban areas, co-modality and especially multimodal accessibility is crucial: In the fragmented, sparsely populated areas it is not possible to support a complex public transportation system.

The question of how to enhance mobility while at the same time reduce congestion, accidents and pollution, is a common challenge shared by all major cities in Europe. Effective transport planning requires long-term vision to arrange the financial requirements for infrastructure and vehicles, to design and promote high-quality public transport, safe cycling and walking, and to coordinate this with land use planning. Solutions need to be tailor-made and based on wide consultation with the public and other stakeholders. Therefore, in its Thematic Strategy for the Urban Environment (CEC, 2006), the European Commission strongly recommended that local authorities develop and implement Sustainable Urban Transport Plans.

A sustainable peri-urban transportation system requires innovative solutions, intelligent mobility technology, new mobility culture, mobility management and integrated planning at all levels. Comprehensive planning should integrate land use and transportation, different parts of the transport system, and different operators and administrations to provide better accessibility for the whole functional region. Transport planning has traditionally focused on increasing mobility, which leads to increasing vehicle transport. In order to achieve sustainable accessibility, the focus must be shifted to accessibility oriented planning, which includes a wider scale of policy options and solutions to improve accessibility without simultaneously increasing the total number of kilometers travelled (see figure 28).

How to implement policies that best exploit the potentials of the peri-urban to meet future challenges

From the peri-urban viewpoint, critical issues related to the transport system and thus accessibility are: economic competitiveness, cost effectiveness of the transport system, and equity. Transport corridors can stimulate peri-urban development, as they provide accessible locations for peri-urban employment and commuting. Peri-urban areas need a self-sufficient local economy to provide local job opportunities and to supply daily goods and services. Sub-regional accessibility should be improved in order to minimise long distance travelling. A peri-urban public transportation system must be effective in order to be a realistic competitive alternative for using a car. In terms of equity, accessibility should not be bound to personal vehicle transport. All transport modes, from walking to aviation, must be considered when examining accessibility.

At St. Paul Metro station, Paris, France

Landscape and Environmental Policies

In peri-urban areas, policy measures for nature preservation and the provision of ecosystem services are already available and should be implemented, together with spatial planning concepts which enhance the attractiveness of inner cities to minimise further sprawl.

Landscape Character

In the year 2000, the European Landscape Convention was signed as the "Florence Convention". It defines landscape as "an area, as perceived by people, whose character is the result of action and interaction of natural and/or human factors". European landscapes are mainly characterised by rural, agricultural and forest dominated areas. They comprise of high natural and cultural diversity, but are threatened by social or technological changes. Therefore, landscape character assessments from the local level up to the European scale are carried out for an inventory of landscapes, representing the requirement to conceptualise and monitor controlled change and managing actions. The convention also covers urban and peri-urban areas where landscape change is intense, and thus the monitoring and impact assessment are most important.

Landscape conservation area Camargue, France

Environmental policy in Europe

In the past decades, European policy put forward many directives, strategies and programmes in order to protect and enhance Europe's environment and biodiversity, such as directives for habitats, air and water quality, the soil thematic strategy, the European landscape convention, and the 6th Environment Action Programme. Although most of them do not explicitly refer to urbanisation, they relate to the development of urban areas, and, vice versa, urbanisation impacts on the intended environmental good of the policies.

Conflicts in peri-urban regions

Despite extensive efforts to enhance Europe's environment, difficulties prevail in the context of urbanisation, particularly regarding peri-urban areas where settlements and infrastructure growth are putting pressure on ecologically valuable and even protected sites. Figure 51 illustrates that especially in densely populated countries, a large share of NATURA2000 sites are considered to be peri-urban.

The example of Slovenia shows that almost 10% of important bird areas (IBA), home to a large

share of endangered bird species, are under peri-urban influence and are thus exposed to stronger anthropogenic pressure, leading to reduced biodiversity (Figure 52).

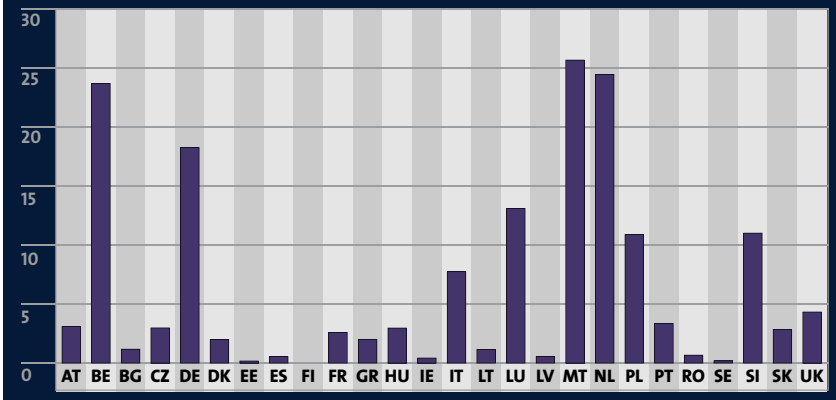
The peri-urban future

The PLUREL scenarios represent different future developments, and their common denominator is continuing urban growth. The question is how the threats and opportunities caused by urban expansion for the environment can be addressed by policy measures.

On the one hand, certain measures must be taken in order to protect sites of ecological relevance. For this reason, a great variety of protection schemes and laws are already in place. In the peri-urban context, the response of sites to urban growth has to be further defined. Ecologically sensitive sites will need buffer zones. Others might even benefit from new niches for species. However, incentives for nature preservation and the provision of ecosystem services in the peri-urban are indispensable, like agri-environmental schemes or the green and blue service concept of the Netherlands. In addition, urban dwellers themselves should use their gardening inclinations in order to enhance the peri-urban environment (e.g. the tree planting initiative in Frankfurt/Main).

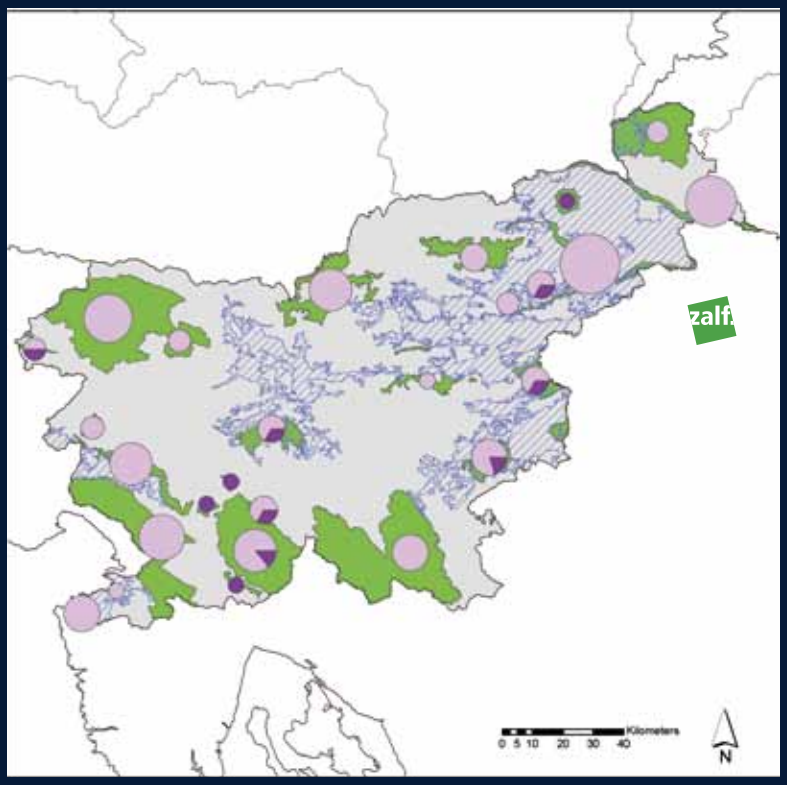
On the other hand, the impact of urbanisation also depends on the way it takes place. As land is a finite resource, more efficient usage is necessary – a fact that was stated in a communication of the EC in 2006 on Cohesion Policy and cities. One suggestion is to use brownfields as building lots instead of greenfields, and to enhance the attractiveness of inner cities to minimise further sprawl. Thus, spatial planning concepts for the urban fringe are necessary to guarantee the ability to gradually densify the built-up areas, while at the same time preserving important green areas and not reducing urban attractiveness. Therefore, cooperation between city and neighbouring municipalities is essential. Such collaborations already exist in some European city regions, especially for recreational purposes, i.e. green belts or regional parks. From the promotion of green roofs and walls, the use of less sealing materials, the construction of infrastructure next to existing facilities to reduce fragmentation, free bike rentals, through to legal limits of daily land consumption, many single measures are possible in order to sustain the environment and the ecological functions in peri-urban areas.

Figure 51: Natura2000 in peri-urban regions in Europe



Source: ZALF, EEA

Figure 52: Number of Endangered Bird Species in Important Bird Areas in Slovenia



Source: ZALF, BirdLife International

- Peri Urban Area
- Important Bird Area
- Endangered Bird Species
- Red List Bird Species (Near threatened/ vulnerable)

Towards EUROPE 2020: Pan-European challenges for the peri-urban

The EU policy goals of growth and development may meet the Lisbon goals, but at present, the problems of urban sprawl, environmental impact and social segregation appear to be attached. This chapter looks at the implications for the peri-urban agenda in light of the pan-European challenges of globalisation, demographic change, energy, and climate change.

The Lisbon Agenda sets a strategic direction for policy and the economic development path across the EU. The Cohesion Funds from 2013 are now being designed around this. However, the PLUREL analysis and modelling suggests that this direction is likely to result in peri-urban expansion, and potentially urban sprawl, at a faster rate than ever before. So here we look at key challenges – cross cutting policy agendas which are powerful drivers of change in peri-urban areas.

- Globalisation and innovation as the driver for economic development: The direct effect of this is peri-urban expansion for business parks, housing, roads and other urban infrastructure;
- Demographic change: The shrinking of some regions, the ageing of others, and the migration of people all bring challenges to the stability and cohesion of peri-urban areas;
- Climate change and energy: This will bring physical impacts and the need for adaptation in the peri-urban. Decarbonising energy sources will also require land for renewables, and may change peri-urban transport and settlement patterns.

If each of these challenges is addressed in isolation from the others, the situation could worsen. So to integrate and generate added value, we need to explore 'integrated development pathways' for 'peri-urban territorial cohesion' (next chapter). Here, we review the trends and challenges, starting from the EUROPE 2020 (CEC 2010a) regional analysis followed by the implications for the peri-urban agenda.

Globalisation and innovation

The benefits of globalisation are the goals of economic policy, businesses and consumers. There is also a downside however, which is becoming increasingly topical in the economic situation post-2010. The downsides include restructuring and obsolescence, redundancy of labour and skills, and the impacts on vulnerable industries and economies at the local and regional level.

In order to turn the challenges of globalisation into opportunities, the Lisbon Agenda requires Euro-

pean economies to increase productivity (both labour and resources), employment levels, and the skills of the workforce. Current trends in the EU show a moderate productivity growth of around 1%, a divergence in workforce education levels, and employment rates with only a gradual improvement. This quite mixed picture is amplified at a regional level.

Spatial patterns across Europe

Many territorial and regional impacts can be traced directly to the Cohesion Funds and other mainstream fiscal programmes. A mid-term sustainability evaluation of the Structural Funding programmes found generally that mainstream infrastructure of roads and industrial sites often created economic gains at the cost of environmental problems. In contrast, skills and capacity building measures appeared to have wholly positive effects (ECOTEC, 2005).

The 'Globalisation Vulnerability Index' of Regions 2020 depicts this in terms of productivity, employment rates and educational attainment, each projected to 2020. Here, the Index is filtered to include only regions which are 'predominantly peri-urban' (Figure 53). This shows that generally, the southern, eastern and peripheral regions are much more exposed to globalisation, i.e. the pressures of restructuring, investment, infrastructure and changing skills demands. And it is very topical that within these regions, the peri-urban areas will be most under pressure for the same globalisation menu – new industrial and business sites, high value housing, and major infrastructure for roads, ports and airports.

Implications for the peri-urban

The peri-urban is generally seen as the default location for enterprise and inward investment, and so the policy objectives of globalisation and innovation are very likely to lead to expansion into peri-urban areas. There is also a restructuring effect, which in more vulnerable regions can leave large peri-urban areas with obsolete industry, unemployment and shrinking populations. There are two main levels of policy:

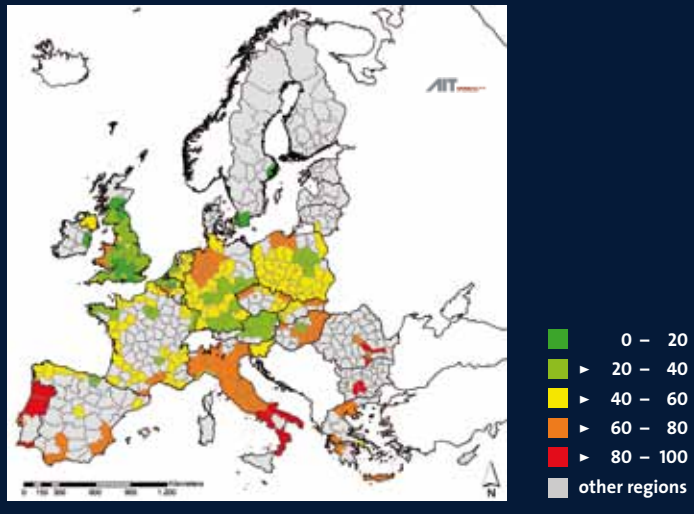
- Regional innovation policy. This has been the theme of a series of pilot programmes since the 1980s. The Bangemann Report (CEC 1994) set the agenda for coordination with mainstream Structural Funds. The practical result on the ground is that regions are in direct competition for inward investment and global entrepreneurs. As such, they are each under pressure to provide more road infrastructure, large industrial and logistics sites, and science/business park developments;
- Urban innovation policy. It is also becoming clearer that the strongest drivers of the 'innovation system' are often focused on urban centres and urban agglomerations. Here, the expansion of Central Business Districts often displaces inner city communities with multiple problems. The need for new business sites to serve ever larger markets and workforces then drives a chain of 'cumulative causation', including new roads, new housing, new retail and leisure parks, in an ever-expanding peri-urban area.

Overall, there are two kinds of challenges raised by globalisation in the peri-urban. One is to manage the impacts of the growth-led development path which is set by the Lisbon Agenda, particularly in regions that are already in rapid peri-urbanisation. Another is to pick up the pieces left over from restructuring in the less modernised and more economically vulnerable peri-urban regions.

Demographic change

Future trends in the natural population processes, such as low fertility rates and the ageing of the population, combined with internal or international migration, may in the long run lead to the decrease of the European population. The renewed Social Agenda

Figure 53: Globalisation Vulnerability Index 2020 in predominantly peri-urban regions in EU 27



Source: Eurostat, ZALF, AIT

Building the knowledge society. Saint Etienne, France

of the Commission of the European Union (2008) reflects this conviction, as it identified population ageing as one of the key factors in social change within the EU. Such demographic change is likely to transform European societies as we know them, and create a whole new economic and social environment.

In contrast to the relatively slow-changing natural population trends, migration patterns can change and fluctuate more rapidly, and are more sensitive to difficult policy decisions. Three forms of migration, i.e. within the country, within the EU and from third countries, have to be differentiated. The 'nationals' (coming to the city from other parts of the same country), the 'other EU nationals' and the 'non-EU nationals' differ substantially in all aspects, from the regulations which influence their numbers, to the way they integrate into the labour and housing market of the city.

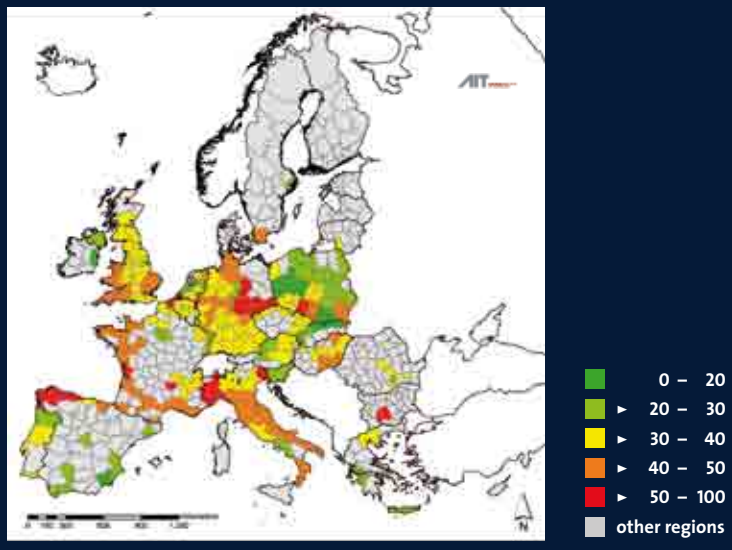
Spatial patterns across Europe

The 'Demographic Vulnerability peri-urban region Index' is based on the share of people aged over 65, population decline and the share of the working age population in 2020, with each factor projected to 2020 (Figure 54). These three factors show different territorial patterns across Europe. Population decline will hit mainly central and eastern European regions, while ageing will be delayed in these regions due to the lower life expectancy. The decline in the working age population will be the highest in Scandinavian countries and Germany.

The distribution shows that most major EU nations contain a range of conditions, with a patchwork-like character. There are rural or more remote areas with a high vulnerability index, a combination of ageing, population decline and working age population. There are also peri-urban regions close to the 'core', with similar problems of ageing and dependency. In contrast, some capital regions like Madrid, Paris or Warsaw appear to have a higher growth and turnover, and so a relatively low vulnerability.

The demographic division of Europe generally follows the line of its economic division. Countries with stronger economies have relatively high fertility levels, and their population growth is also aided by migration. The extension of current trends to a longer time horizon, beyond 2020, suggests that demographic challenges will accelerate the existing interregional differences, reducing the chance of more peripheral EU regions ever catching up. On the basis of fertility rates and migratory patterns, three major areas of demographic change within the European Union can be defined:

Figure 54: Demography Vulnerability Index 2020 in predominantly peri-urban regions in EU 27



Source: Eurostat, ZALF, AIT

- Western and northern European countries. This is the high fertility belt of Europe, where there is also a high level of immigration;
- Southern Europe and the German speaking countries. In these areas, low fertility is combined with replacement migration that can help to compensate for the population loss;
- Central and eastern Europe. In these countries, a low level of fertility is combined with very little or no migration at all (in a few cases even extensive emigration) which leads to accelerating population decrease.

The Kröhnert et al. (2007) study evaluated the dynamic of natural population in itself, without external migration figures, as the latter depend on different political factors. The results show *"...populations dive by 12 to 18 percent by 2030 in the Baltic states, Ukraine, Belarus and large swathes of rural Bulgaria and Romania as well as remote parts of Poland and east Germany."* Thus the continuation of present trends might lead to some peri-urban regions (and to a lesser extent, cities) in eastern Europe becoming almost deserted. On the other extreme, some areas in western Europe might become much more crowded than they have been to date. Both developments may cause problems and raise the question as to what type of public interventions are needed regarding demographic and migration patterns, as well as related aspects.

Implications for the peri-urban

Overall, there is a range of demographic challenges that particularly affect peri-urban areas:

- Peri-urban areas with problems of growth or shrinkage;
- Peri-urban restructuring, for ageing and other kinds of segmented communities;
- Peri-urban areas under pressure from migrants. This can be voluntary migration from lifestyle or retirement groups. It can also be a result of urban 'enclaving', i.e. residential and labour segregation that slows down migrant assimilation, perpetuating inequities in social mobility and employment across ethnic groups. While enclaves of third country migrants affect mainly urban areas, national migrants can more easily concentrate in peri-urban areas where there are cheaper land prices.

Regional and metropolitan area governments have some scope to influence the economic and social impacts of demographic trends. The policy agenda starts with urban-rural linkages, which were discussed by the OECD (2009): *"If well managed, the interactions between urban centres and countryside are the basis for a balanced regional development which is economically, socially and environmentally*

sustainable. ... The spatial structure of polycentric regions can enable them to reap the scale and agglomeration advantages typical for large cities, and at the same time avoid some disadvantages of large cities like high factor costs, congestion or pollution. ... It would ... be important to study whether better connections ("linkages") between rural and urban areas can induce people to substitute migration with commuting." Such 'localised' responses are essential. However, the macro-regional population movements, with the prospect of empty areas in the East versus overcrowded peri-urban areas in the West, needs pan-European strategies and policies.

Energy and climate change

Many peri-urban areas are dependent on road transport and vulnerable to energy shortages or price rises. They are also vulnerable to climate impacts, and under pressure to find land for new sources of renewable energy. In areas of unplanned urban sprawl, the dependency on transport fuels is highest, the climate change impacts may be highest, and the capacity to respond and adapt may be the lowest. Firstly, the following is an outline of the range of climate impacts on the peri-urban environment:

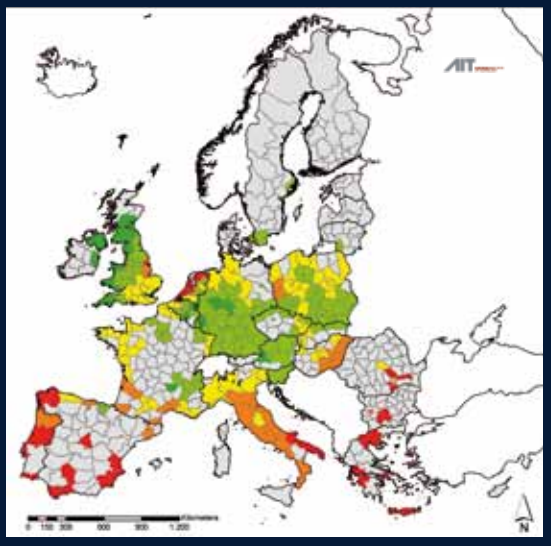
- Droughts and extreme heat periods. The urban heat-island effect will overlap physically onto peri-urban areas. And the effects of the urban heat-island are very likely to drive people out of the cities into peri-urban areas;
- Flooding and extreme weather events. Flood plains and water retention areas are traditionally sited in peri-urban areas. The problem is that land values and pressure for development encourage such areas to be built on and artificially surfaced, thus worsening the problem;
- Sea-level rise and salt water incursion. This applies to coastal/estuarial areas, which are often peri-urban areas in close proximity either to high quality farmland, or industrial plants, or urban infrastructure;
- Soil erosion is a driver for desertification and fine-dust contamination, which contributes to lung diseases. Strengthening landscape structures in peri-urban areas can enhance air filtration and soil stability, and limit the abandonment of traditional farming;
- Invasive species and habitat decline or fragmentation. This is connected with each of the above. It is particularly topical in peri-urban areas that are often fragmented by roads and other urban infrastructure;
- Synergistic and cumulative effects are likely to drive the worst problems. For instance, in the EU heat wave of 2005, mortality and morbidity was increased by lack of social cohesion. In many peri-urban areas, there are fragmented communities, local economies, governance systems and cultural groups.

Energy and climate mitigation policy

The peri-urban areas are also a key focus of energy policy and emissions mitigation policy:

- New forms of renewable energy and distribution. Even though many of these are sited in remote rural areas, there are often conflicts with landscape and nature conservation. Such energy plants can be community owned or controlled as part of a decentralised energy system, and so there will be demand for peri-urban locations that are able to localise energy systems, together with associated materials and waste systems;
- Transport fuel prices are likely to rise, brought about by a combination of shortages, energy investments and emissions mitigation policies. There are increasing policy pressures for higher urban densities and clustered settlements. It is not so likely that peri-urban populations will migrate back into cities, but more likely that population movements will shift from remote rural towards peri-urban areas, closer to urban services and employment. Thus there could be increased pressures on peri-urban areas to accommodate growth within the most sustainable settlement and transport pattern;
- At the same time, there is policy pressure to create attractive, high quality urban communities to limit outward migration. Much of this effort will focus on the peri-urban areas, where much of the population live by choice;
- Protection of carbon sinks and storage in both rural and peri-urban areas. This will be topical where there are multifunctional land use objectives, such as habitat conservation, tourism and heritage, or other ecosystem services that link rural to peri-urban to urban areas.

Figure 55: Climate Change Vulnerability Index in predominantly peri-urban regions in EU 27



Source: Eurostat, JRC, DG Regio, ZALF, AIT

Spatial patterns and challenges

The peri-urban Climate Vulnerability Index (Figure 55) shows quite a clear picture. The arid Mediterranean regions face multiple challenges of rising temperatures and water stress, leading to soil erosion and rural abandonment. Northern coastal regions such as the Netherlands and Belgium are also at increasing risk of sea-level rise and storms. Other low lying areas in western France, northern Italy and Poland are also at risk from river flooding, soil erosion and ecological disruption. However, there are still inland peri-urban areas in the core regions which are relatively low risk at present.

Overall, the policy challenges from energy and climate change are manifold. If peri-urban areas were carefully planned, and strategically governed, these challenges would be a more straightforward problem. But at present, there is fragmentation of governance, conflict between market and state, arguments over the allocation of costs and benefits, and uncertainty over the economic and technological trajectory. So there is a very topical agenda to be followed up on for each of the main policy themes in the peri-urban areas:

- Built environment planning and design (particularly transport infrastructure) for emissions reductions;
- Peri-urban land use change, both for climate adaptation, and for development of renewable energy sources;
- Protection of infrastructure in the peri-urban areas that is at risk, such as waste, minerals and communications;
- Developing other sectors, such as local food production, which can strengthen each of the above, while adding to employment and diversification;
- Encouraging business innovation, social enterprise and community resilience to cope with such changes.

This overview of climate and energy issues shows many links with other sectors, such as housing, transport, economic development, agriculture and forestry. There is also the wider challenge of coordinating climate change action with the challenges of globalisation and demographic change. As in the next chapter, this suggests the need for new ways of putting it together, i.e. multilevel, multi-sectoral, multifunctional 'integrated governance for peri-urban territorial cohesion'.

Flooding at the Elbe river in Lower Saxony, Germany, 2010

INTEGRATED DEVELOPMENT

AND EU POLICY OPTIONS

Integrated Development for Peri-Urban Territorial Cohesion: The agenda for integration

The challenge of managing peri-urban areas calls for multi-level, multi-sectoral, multifunctional 'integrated governance for peri-urban territorial cohesion'. But this is easier said than done. So this chapter sets out solutions and opportunities, firstly for the territory of the rural-urban region, and then for the governance system itself.

This chapter takes an overview of the 'peri-urban agenda' from many sectors. In particular, it takes on board the EUROPE 2020 challenges and their implications for peri-urban areas. From this it is clear that there are widespread conflicts between different sectors: between the needs of city and country; between the growth and conservation agendas; between wealth and poverty; and between local and regional agendas. We can therefore raise some more strategic questions (Ravetz, forthcoming):

- How can the policies for different sectors be integrated to avoid conflict and enhance opportunities? This calls for a **multi-sectoral** governance.
- How can different types of actors and stakeholders be brought together to address complex territorial problems? This calls for **multilateral** governance.
- How can physical, social and economic development in the peri-urban area be governed, often with fragmented units and boundaries? This calls for a system of **multilevel** governance in the most suitable territorial units.

The starting points are very important:

- **Peri-urban problems and opportunities need to be managed in their context at the wider level of the rural-urban region**. Otherwise the peri-urban will continue as a resource cupboard and dumping ground for the urban system.
- **The rural-urban region is the optimum unit for strategic governance and integrated development planning**. But in reality the administrative, economic, social or environmental units are often different. So the rural-urban region is a policy framework and a way of working for managing problems and opportunities more than a fixed boundary.

Rural-urban regions as territorial units

Integrated development models and integrated governance systems are therefore needed. These should be multi-sectoral and multilateral. For all these, the rural-urban region level is the most suitable for such integrated development models. Analysis of the new geography of the peri-urban shows that the conventional urban area and its administrative units are too narrow (NUTS4), while the administrative 'region' (NUTS2) is usually too large. So the rural-urban region is the optimum size of territory for the integration of needs and opportunities between urban, peri-urban and rural areas.

However, the actual boundaries of ecological watersheds, economic functions and community identities are often different to government units at NUTS 3 or equivalent. There are tensions between global and local, and between urban and rural agendas. The rural-urban region level of governance and policy-making therefore does not have to work inside a fixed boundary. It is more like a strategic framework that aims to respond to problems and seek opportunities wherever needed. This being the case, if an urban area has clear links with a rural area, then they are both in a rural-urban region and should be managed as such. There are two strands to this: 'linkage types' and 'area types'. For the linkage types, the diagram shows a range of possibilities (Figure 56):

- Direct rural-urban linkages including physical and environmental flows and ecosystem services, water resources and flood control, energy and minerals, farm and forest products, landscape and biodiversity.
- Indirect rural-urban linkages including social, cultural and economic flows, as well as the ecosystem services of amenity, leisure, aesthetics and identity.
- Each of these has economic linkages and opportunities for investment and development.
- Each also has social linkages, with opportunities for improved balance, resilience and quality of life.

These linkages are combined in real places and spaces, shown here as 'area types'. The policy agenda for each is then formed as a localised 'territorial cohesion'. This contains a series of territorial 'integrated development models' for the rural-urban region and all of its parts:

- For enterprise zones, science parks, airports, and other specialised sites, there is a policy agenda for spatial strategies and patterns. These should steer monofunctional chaotic 'sprawl' towards more diverse and resilient patterns of polycentric development;
- Housing, communities and peri-urban settlements, both old and new, face challenges of social cohesion and economic vitality. Spatial planning needs to be integrated with the agenda for local diversification and social enterprise;

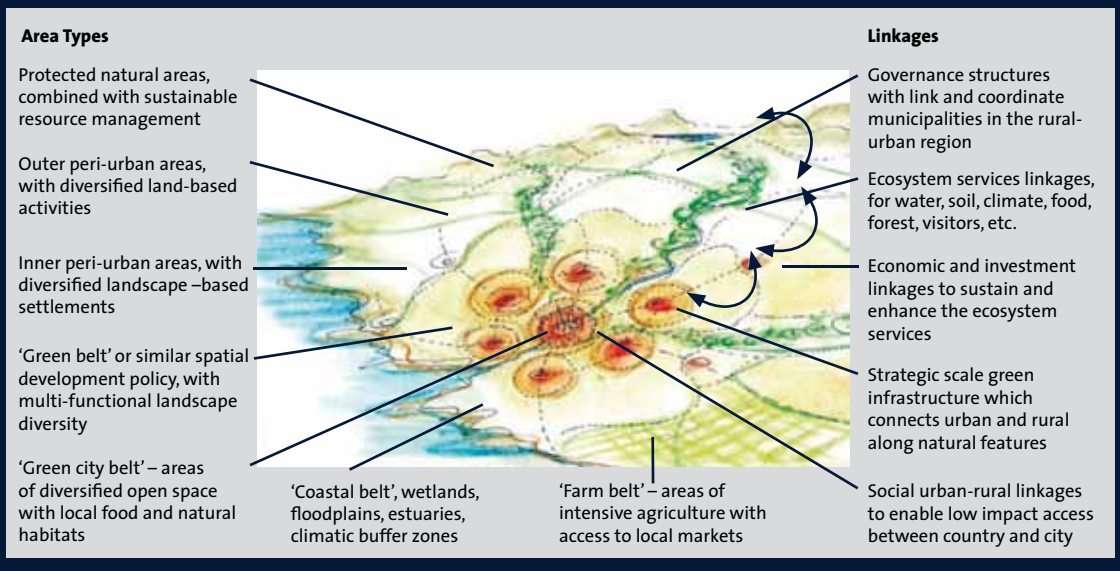


Figure 56: Planning the rural-urban region

- Green and blue infrastructure in the peri-urban. In order to compete with roads, housing and industrial development, this needs stronger funding and legal powers that enable the benefits of investment to be returned to users and residents;
- Rural hinterland with natural or semi-natural areas. A priority for rural-urban linkages, with diversification in farming and forestry. Also ecosystem services exchange and strategic management of natural assets.

Visions and goals for integrated development

There is an overarching question on policy for peri-urban areas – is there a vision for integrated development that works for real places and spaces? Does this mean not only the avoidance of sprawl, but a positive vision?

At the city region level, the peri-urban is often a battleground between global and local, urban or rural. There is a powerful dynamic of development and enterprise, accelerated by global finance, technologies, networks and media, with the airport and 'aero-tropolis' as the main hub, pushed by landowners, financiers, entrepreneurs and householders (figure 57). The result can be seen as a 'Type A' city region – sprawl, waste, pollution, congestion, exclusion, and overall vulnerability.

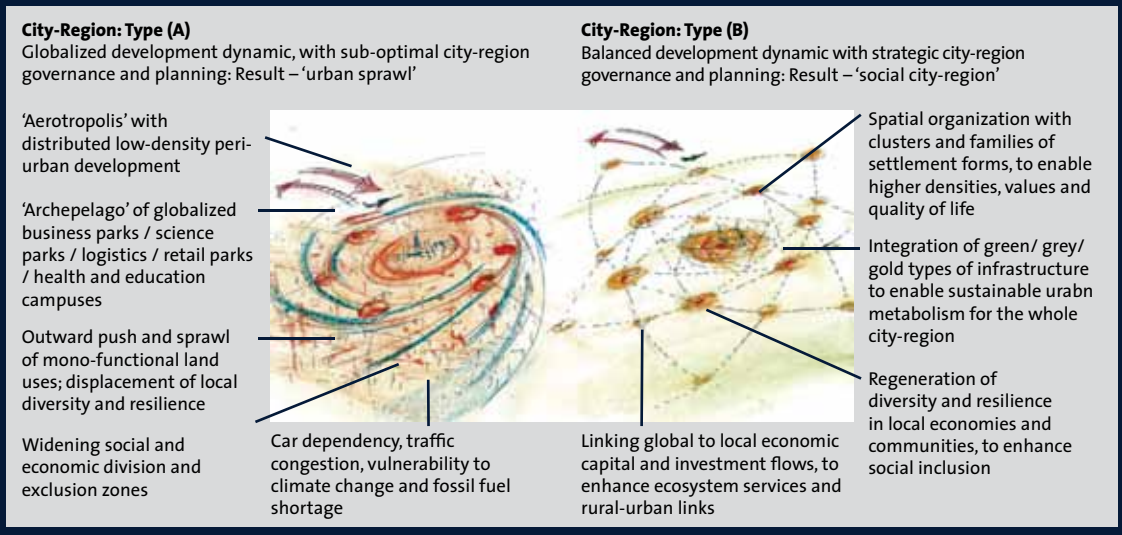
In response, the integrated development approach, or 'Type B' city region, sets out a positive vision which aims to bring together global and local agendas:

- Pro-active spatial planning that aims for clusters and hubs, for both living and working spaces, with a hierarchy of community types related to service levels;
- Transport infrastructure that enables multimodal integration, with alternative forms of responsive or distributed networks where needed;
- Economic development that links local enterprise to global investment, thereby building resilience and diversity in SME supply chains, labour and property markets;
- Environmental policy that enhances ecosystem services, urban-rural linkage and ecological resilience, with a multifunctional land use strategy;
- Local government which works across borders, with both formal and informal networks and co-operative structures.

New governance concepts

Governance in the sense of public interest decision making and the management of public services is in a state of flux. The boundaries are being redrawn between market and state, between the different sectors and professions, and between different levels from local to global. Expectations are rising along with the challenges, while the public trust in political leadership and public services, in many places, is falling. Success may depend not only on **more** governance, but on **new forms** of governance.

Figure 57:
Visions and goals for the city-region



The comparison of regional case studies in PLUREL brought this agenda to the fore (Aalbers and Eckerberg, 2010). There were four main fields of investigation related to the application of recent thinking on multilevel governance:

- **'Rules of the game',** i.e. the formal structures of government and spatial planning. In some cases, these were quite fixed and detailed. In others they were quite fluid. And in yet further cases, there was a kind of dual governance that combined elaborate rules with a parallel low level of corruption, favouritism and nepotism. The policy recommendation is clearly for extended strategic governance at the rural-urban region level. However, this is politically difficult in many cases;
- **'Control of resources',** particularly ownership or control of land, utilities and finance by the public sector. In most EU regions, there is a shift away from social democratic states towards neo-liberalised modes of privatisation, franchising and deregulation. Therefore, effective control of resources is more concerned with the mobilisation of a wider community or coalition by the government;
- **Coalition** and the process of forming wider social and ideological partnerships is a key theme. Each of the peri-urban cases was driven by some kind of partnership or social contract between public sector agencies, landowners, financiers, farmers, utilities and so on. Conflicts over land use and resources can be understood as ideological coalition conflicts as much as the actual case;
- **'Discourses'** or ideological narratives. This is perhaps the most powerful and the least understood of dynamics related to peri-urban change. Certainly the discourse of polluted, dangerous cities versus clean and safe countryside is responsible for much peri-urban change. Public discourses feed coalitions, coalitions grab resources, and with resources they can shape the rules of the game. In this sense, a discourse of peri-urban change does not have to be negative, except that it can focus and magnify existing divisions and conflicts in society, as formed in land use patterns.

Governance in the peri-urban context

The implications of this are interesting. Firstly, the peri-urban territory is a new and fluid kind of geographical space, where conventional 'governance' is often lacking. By its nature, the peri-urban crosses administrative boundaries, with changes driven by local and global forces. It is often the site of conflict between wealthy and poor, city and country, immigrants and natives, or new and old. Such conflicts are brought into focus by questions such as: Whose is this territory? Who decides what happens? And who gets the costs or benefits? In general, there are new challenges for governance in the peri-urban situation:

- Linking territories to networks which cross multiple boundaries, with sometimes highly mobile and globalised social-economic groups;
- Multifunctional policy agendas for the peri-urban landscape relating to energy and carbon, food, leisure, ecology, business park, retail park etc.;
- Multilevel decision making where strategic and local objectives need to be coordinated;
- Multi-sector working, which aims to realise the potential and added value from a wide range of stakeholders and 'communities of interest'.

Peri-urban sustainability?

Sustainable development is a manifold idea that combines economic, social and environmental goals, both locally and globally, and in the shorter and longer term. This applies to peri-urban areas as with others. The role of the peri-urban however, is in reality not so much its own territory, but a hinterland – a support system and dumping ground for the dominant urban activity. For instance, a typical site in a peri-urban location may have conflicting claims from local communities, from ecologists or farmers, from city planners and road engineers, or from global entrepreneurs.

If sustainable development policy is to intervene between such conflicts, it will need a wider strategic view, i.e. at the rural-urban region level. Within this, there will be different **'sustainability agendas'**. These can be defined by urban or rural needs, and the development/ conservation agendas (CURE, 2003):

- **Urban development agenda.** A growth and modernisation perspective that aims towards a zone of enterprise, innovation and quality of life in meeting the needs of urban areas;
- **Urban conservation agenda.** A containment and regeneration perspective that aims at a managed zone via a Green Belt and other spatial policies in order to protect and enhance urban areas;
- **Rural development agenda.** A more local policy perspective that aims at a zone of indigenous development, with policy and investment targeted at rural communities and businesses;
- **Rural conservation agenda.** An environmental protection perspective that aims at a zone of landscape restoration, resource conservation and local produce.

Such policy agendas are based on different concepts of urban and rural. But again, the peri-urban covers both these and more as a newly emerging geographic type of 'metropolitanised' territory. This suggests a second approach – to focus on the **'functions'** or **'services'** from ecological or urban systems, and the relationships of their components:

- **'Ecosystem services'** describe the interactions between the physical environment and human societies (Millennium Ecosystem Assessment, 2005). They are classed as 'provisioning, socio-cultural, regulating and supporting' types of services;
- **'Multifunctional land use'** can provide 'win-win' solutions that fulfil more than one of the sustainability agendas above (Forman, 1995; Piorr and Müller, 2009; Zasada, 2011);
- **'Peri-urban land use relationships'** (as in the PLUREL project title) can then be seen as a kind of 'spatial ecology' (Figure 58). Different activities with different land uses, e.g. airports, waste

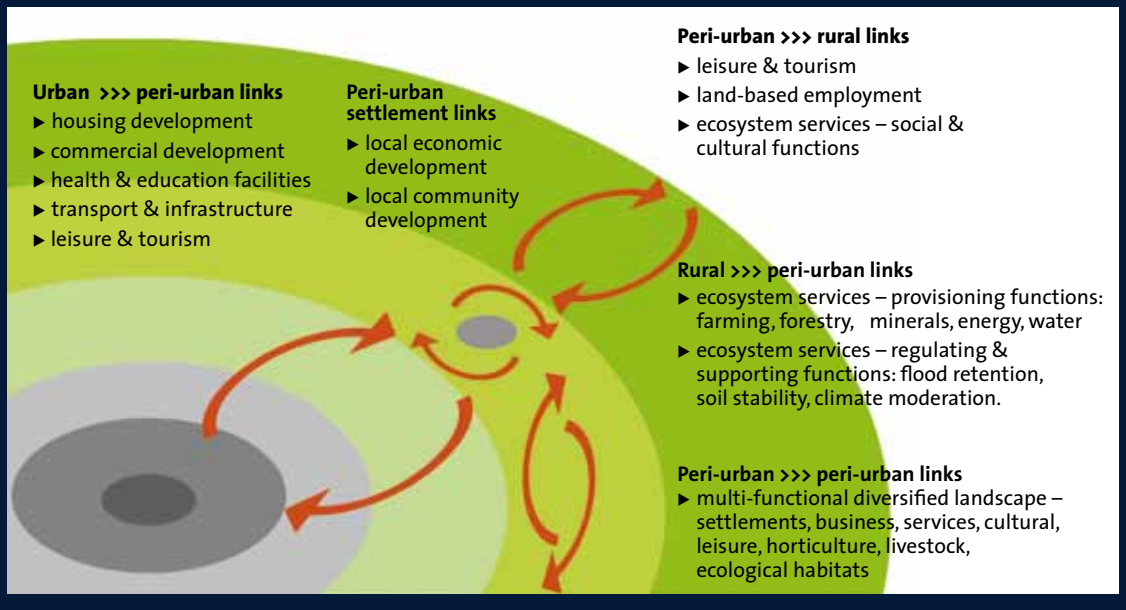


Figure 58: The rural-urban region and its linkages

Showing the 'peri-urban land-use relationships', from the PLUREL methodology. This extends the 'ecosystem services' approach to a wider view on 'functions, services and values': the basis for integrated development policy in the rural-urban region.

water plant, executive housing and heritage landscapes all provide a range of functions and services to others. This not only shows a single gradient between urban and rural, but many more kinds of relationships. The sustainability goals then apply to the whole system rather than just its parts.

Thirdly, in each sector, there are practical sustainability goals and targets that apply to the peri-urban situation. Some of the most topical targets include:

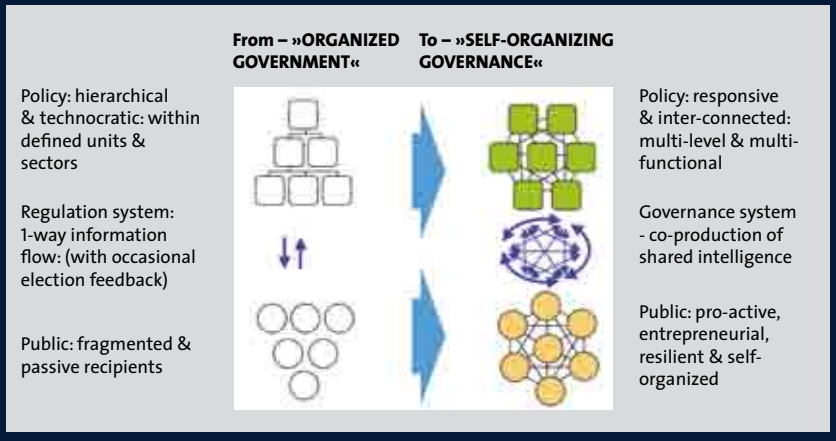
- Climate change emissions targets in urban and peri-urban systems. This links to settlement structures, land use, landscape patterns as well as for adaptation potential, although this is not so easily measured;
- Transport, energy, water and other urban infrastructure. The efficiency and external impacts again are linked to settlement structures, land use and landscape patterns;
- Land quality, soil quality and other biophysical resources and flows that are central to the ecological concept of sustainability.
- Sustainable forms of food production, forestry and other land uses including larger scales as well, such as the contribution of peri-urban food systems to the urban-global food system.

New forms of governance

These sustainability goals are not just a matter of targets. They also concern the way that systems work, in settlements, in landscapes, or in the interactions between them. It follows that the governance which aims to enable them also needs to be more focused on the whole system rather than its separate parts. This suggests an agenda for 'transition' in governance, as in Figure 59:

- From the former command-style **'organised government'** with hierarchical structures, one-way communications, and (typically) elections once every 5 years;
- Towards a more fluid and responsive **'self-organising governance'**. This is based on networks of enabling, influencing, mobilisation, coalition and relationship building, between multiple stakeholders at multiple levels. New opportunities are emerging to support such a transition, such as new ICT and Web2.0 social network systems, new forms of public participation and deliberation, new forms of stakeholding, and the tolerance of minority groups and cultures;
- Such a self-organising governance is not the whole story. It relies on a 'regime' or institutional structure, just as free markets rely on strong regulation, or self-organising communities rely on strong social norms.

Figure 59: Peri-urban governance – paradigm shift



New institutional models

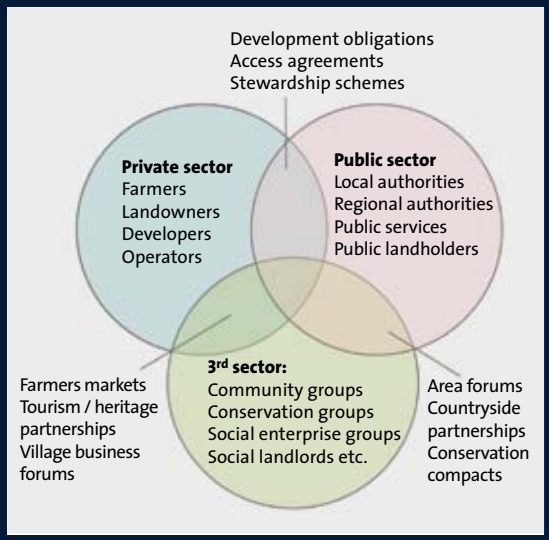
New forms of institutions and partnerships can also be seen at work in the peri-urban. Where there is overlap between public, private and 'third' sectors, the results can combine the innovation of the private sector, the security of the public sector, and the ethical values of the third sector (Figure 60). We can classify these partnerships and linkages into three basic combinations – public-private, private-community and public-community – where each sector has certain strengths, weaknesses, opportunities and threats.

- **Public-private linkages** include various partnerships and consortiums, ethical procurement, supply chain initiatives, and much of mainstream economic development activity.
- **Private-community sector linkages** include local business or regeneration partnerships, social investment funds, 'mutual' or cooperative finance firms, corporate trusts and companies, consumer clubs and networks, cooperatives, community development trusts and other forms of social enterprise.
- **Community-public sector linkage**s include voluntary sector compacts, neighbourhood partnerships, customer charters, intermediate labour markets, social trading, and other forms of community enterprise.

Each of these can have a role to play in a typical multifunctional peri-urban project. For instance, many peri-urban country parks in the UK are owned by non-profit organisations, with a public-private partnership for infrastructure investment, a business-community section for commercial tourism and a public sector-community 'land trust' with education and training programmes.

To square the circle ...new challenges ask for new institutional integration. Melbourne, Australia

Figure 60: Peri-urban institutions & partnerships showing typical examples from the peri-urban case studies



New policy intelligence models

There are technical challenges in multi-sectoral, multi-functional and multilevel governance, particularly in the fragmented peri-urban situation. Experience shows that different sectors speak different languages with different incentives. So we need ways of improving 'policy intelligence', which does not only mean more information, but better knowledge management through the whole policy cycle from capacity building, to analysis, strategy, implementation and evaluation.

This is a challenge for existing governance systems – generally arranged in departmental boxes – to respond to agendas which are multifunctional, multilevel, multiagency, intergenerational and so on. The concept of 'strategic policy intelligence' brings this all together:

- Exchange of technical information from different sectors;
- Application to the policy cycle, with stages including survey, analysis, strategy, implementation and evaluation;
- Organisational capacity building and innovation, learning and skills development;
- Anticipatory governance through foresight and future studies, systems thinking and strategic planning.

One example is the peri-urban climate change agenda (see previous chapter). Peri-urban development is particularly vulnerable to climate change impacts, while at the same time, it may be the preferred location by climate-stressed urban residents. Figure 61 shows a view of climate adaptation in the peri-urban as multiple interactions between multiple types of stakeholders.

New entrepreneurial and value added models

In the 'institutional' and 'intelligence' models above, the question is – what kinds of incentives and motivations can help to achieve them? How do we get from here to there? This raises the concept of 'value', and the process of generating 'added value'. Value is an economic concept which might be measured in money terms. It is also a social, political or cultural concept more suitable for other kinds of measures. The challenge for governance can be seen as the enabling of value-added activity by and for all stakeholders – not just for a static balance sheet, but as a creative and entrepreneurial process. In the peri-urban situation, the best practices and the most valuable opportunities will often combine economic, social and environmental kinds of added value:

- In Local Economic Development (LED), value is added in business self-help models. But greater potential exists in new kinds of partnerships between businesses, landowners, consumers and intermediaries;
- In local community development, a 'social enterprise' approach can generate cultural projects, such as heritage and arts events, public health

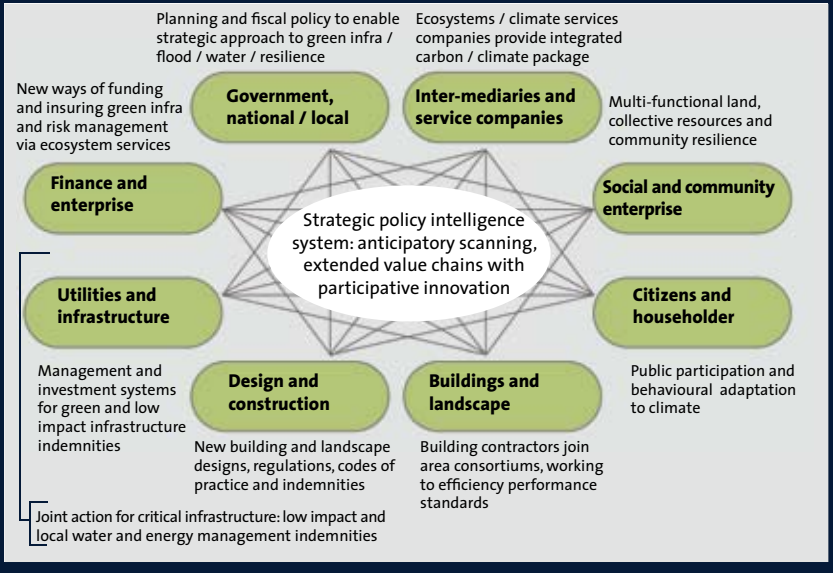


Figure 61: Strategic policy intelligence - climate example

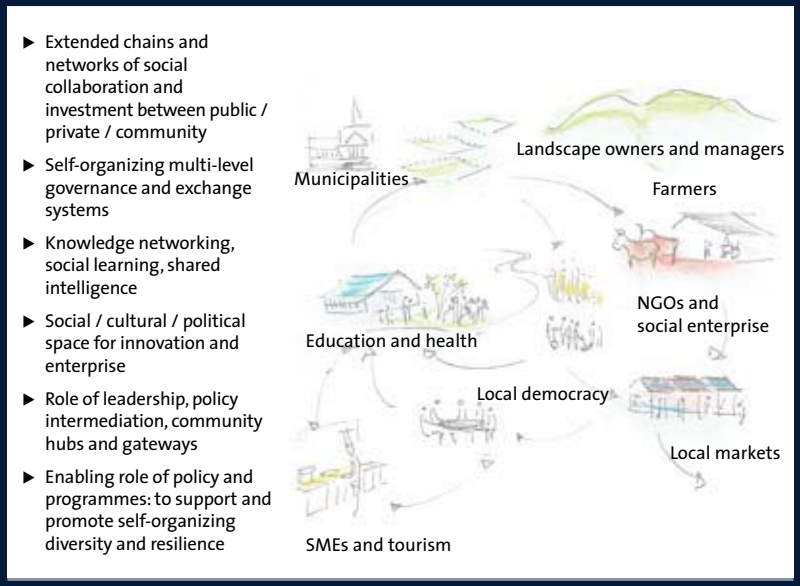
showing the different roles & relationships of stakeholders, and the potential for a policy intelligence system

projects, activities for young or old people, education and skills training, re-use of obsolete buildings and so on.

- In local environmental action, the concept of Ecosystem Services opens the door to a wide agenda. There are new possibilities emerging from benefit-exchange models, cost recovery models, asset transfers, carbon markets, flood resilience and many other forms.

One example is the Todmorden 'Incredible Edible' scheme for local food cultivation (http://www.incredible-edible-todmorden.co.uk). This is an entrepreneurial partnership that in just three years has transformed the way a town of 20,000 people manage and think about food. It now involves landowners, farmers, schools and children, markets, delivery merchants, supermarkets, health services, restaurants tourism operators and others (Figure 62).

Figure 62: Peri-urban local integrated development – example
showing the different based on the local food scheme in the UK South Pennines: www.incredible-edible-todmorden.co.uk/



'Incredible Edible' initiative, planting food to share in public spaces: 'Watch this space, come back and taste something tasty'. Todmorden, UK

Summary: Integrated development in rural-urban regions

Overall, there are two main strands to the agenda for integrated development:

- Peri-urban problems and opportunities need to be managed in their context, at the wider level of the rural-urban region. Otherwise the peri-urban will continue as a resource base and dumping ground for the urban system;
- The rural-urban region is the optimum unit for strategic governance and integrated development planning.

An overall picture begins to emerge for 'putting it together' – **integrated governance and development for rural-urban regions.** By working at this more strategic level, the particular challenges of the peri-urban areas can be addressed and solutions can emerge.

Firstly, the peri-urban agendas for each sector – economy, demography, housing, transport, agriculture, tourism and environment – need to be brought closer together (Chapter Peri-Urban Agendas). For the coordination and public control of development, we need a strong and democratic local government system. This depends on factors such as the financing and taxation base, the level of transparency and participation, the strength of spatial planning, and particularly, the coordination at the wider level of the rural-urban region (Chapter Managing Growth).

The European policy systems and forward challenges are part of the problem, but also, hopefully, part of the solution. Globalisation, demographic change and climate change are all powerful forces of change in the peri-urban areas (Chapter European Policy Agendas).

This chapter shows the potential for responsive 'bottom-up' forms of governance – not to replace formal policies, but to work alongside them and make them go further. In parallel, there are 'territorial models' for spatial development in rural-urban regions, and all the location types within them.

Overall, there is a policy menu for putting the whole picture together – policy solutions for the peri-urban through **'integrated development models for rural-urban regions'.** These can be arranged in five key themes:

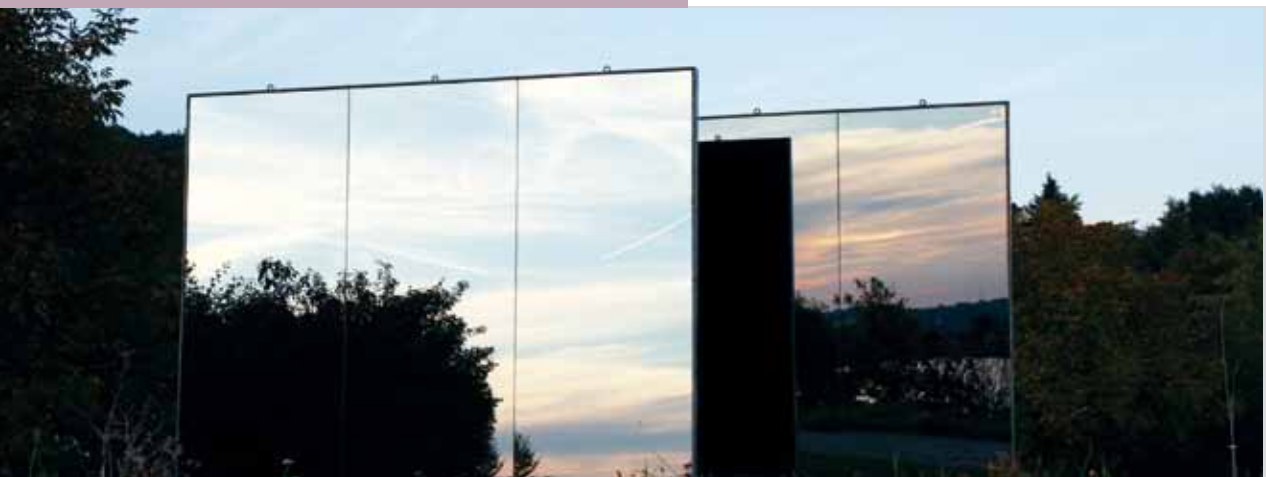
- **Spatial strategy.** This involves a policy framework at the level of the rural-urban region, coordinating peri-urban development and low-impact infrastructure and setting up controls and incentives to avoid sprawl. The focus is on the peri-urban as a priority agenda together with its rural-urban linkages and relationships;
- **Economic strategy**. This involves peri-urban diversification and resilience of local economies and employment, rural diversification, urban regeneration with improved urban-rural links, property ownership with social and environmental responsibility and public access. The focus is on the social economy and social enterprise in the peri-urban;
- **Social strategy.** This involves housing and service provision to encourage balanced, inclusive and resilient communities, leisure and tourism that is open and accessible, value, and a safeguarded social and cultural heritage. The focus lies on the needs and opportunities in different settlement types in the peri-urban;
- **Environmental strategy**. This involves ecosystem-services policy and investment systems, climate change mitigation and adaptation, landscape and habitat conservation, and multi-level green-blue infrastructure. The focus is on the agenda for diversified, multifunctional agriculture and forestry;
- **Governance strategy**. This involves strong and democratic municipal government, healthy finances and an active role in the local economy, along with transparency among public and stakeholder participation. The focus is on the capacity for strategic and cross-border coordination at the level of the rural-urban region, as well as on a sustainable development that caters for the needs of all stakeholders, and does not simply reproduce existing structures of wealth and power.

Application to multilevel governance

It is easy to call for multilevel and multi-sectoral governance, but not as simple to make it a reality. It is therefore a good reason to work at a number of levels, from local to regional, national and EU level. There are also good reasons to work with both formal and informal governance, in the event of governance gaps or policy failures at one or another level. So the 'integrated development model' above is designed to work directly at the rural-urban region level, and also above or below this level:

- A community-led 'bottom-up' approach. This looks for added value at a more local level including self-organising communities of interest, with residents, landowners, infrastructure firms, businesses, social enterprises, health and education, NGOs and community organisations;
- The rural-urban region itself is a policy-driven concept. Where an urban area has clear links with a rural area, then they are *de facto* part of a rural-urban region, and need to be managed as such;
- EU-initiated top-down approach. The next chapter sets out strategic options for the contribution of EU policy. Some of these rely on a strong EU commitment by national governments, and strong public finances that are presently scarce. Others mark more flexible ways for the EU level to support and enable other levels of activity towards the required sustainable and integrated direction.

EU countries are very different regarding the chances of these three types of organising governance approaches. Reality may prove the need for a mixed approach, for which an EU level framework, as in the next chapter, should enable and encourage. Overall, these new models of peri-urban governance are in many ways old models. They need to be reinvented for the new challenges of globalising networked peri-urban territories in the 21st century.



Land art: mirrors near Linz, Austria

NEW EUROPEAN DIRECTIONS

Policy integration: the need for EU level coordination frameworks

There is a growing urban sprawl problem across the EU, but also an integrated peri-urban development opportunity and agenda. Both problems and opportunities need to be addressed by all EU policy and funding programmes that have implications for spatial development and territorial cohesion. To cope with the problems and make the most of the opportunities, territorial 'integrated development' models for rural-urban regions should become a requirement across all EU countries. To implement this step, we have identified five possible options for EU-level policy and/or financial intervention. The advantages and possible drawbacks of these options are discussed, so that EU policy makers and stakeholders can take the agenda forward.

The problem at the pan-EU level

The PLUREL research shows that EU policy goals – as in the Lisbon Agenda – are very likely to accelerate urban sprawl in light of current trends. The highest growth scenario, which is mostly driven by global enterprise and innovation, leads to the highest increase in artificial surfaces. Within all scenarios, it is the peri-urban areas of the regions where this change will be the most intense – on average, an increase of between 1.4 – 2.5% per year. On the European spatial scale, it is the most developed Central or 'Pentagon' peri-urban regions that will receive the highest increase in urban development, possibly doubling their existing area by 2040.

These results clearly show the threat of further increases to existing disparities within Europe. The pressure for increased urbanisation is most intense in areas which are already mainly peri-urban and in many aspects over-densified. Given that further urbanisation is more or less inevitable, there is a policy choice which depends on the level of public control over land use changes: urban sprawl or more concentrated (compact/polycentric) urban development.

The analysis of the main future challenges of European development (ageing, climate change, globalisation, energy shortages) has highlighted the problems of narrow sectoral approaches. For instance, zero-emission houses can be too expensive, affordable housing often encourages car use, and compact development might exclude low income earners. Tackling any one challenge separately usually creates additional problems for others. These conflicts are especially significant in the peri-urban areas. Economy- and housing-induced sprawl is in conflict with land for agriculture and recreation. There is also competition for water between agriculture, industry and domestic use etc. Overall, there is a range of spatial problems at different scales that are often most challenging in peri-urban areas:

- Urban-rural balance. Urban sprawl can easily destroy the viability of both urban and rural areas;
- Interregional balance. Many peri-urban areas are either depopulated or over-pressured by commuter settlements;
- Cross border effects. Many agglomerations and functional rural-urban regions cross national borders and need integrated forms of planning;
- Pan-EU balance. For example, there are imbalances between shrinking eastern regions and the over-heated Pentagon area, or from remote Nordic areas to the sprawl on the Mediterranean coast.

The recent Europe 2020 strategy seeks to integrate the economic, environmental and social aspects of development. To achieve the new smart, sustainable and inclusive development path, strategic coordination of both policy goals and market processes are needed as summarised by the Leipzig Charter:

- Transversal – coordination across sectoral departments;
- Vertical – a multilevel governance system where each level contributes to the integration of sectoral policies;
- Horizontal – multi-territorial coordination between cities, urban/rural linkages and metropolitan agglomerations;
- Multilateral coordination involving citizens and all actors concerned.

The limited results so far of the Lisbon Agenda show that EU-wide strategies cannot succeed without the sharing of responsibility at the sub-national level. Similarly, one of the main weaknesses of the Europe 2020 strategy is the lack of a territorial dimension. The PLUREL results show how the Europe 2020 policies depend on the territorial level of integrated planning to assure the green and social aspects of economic development strategies. They also underline this should focus on the rural-urban region unit that brings together functional urban regions with their peri-urban and rural surroundings.

PLUREL analysis has shown that the public steering of market processes towards sustainable development presupposes strong formal government institutions and planning systems, as well as coordinated functioning of financial and sectoral policies. The bottom-up, more informal governance aspects are also crucial for integrated development at the rural-urban region level. While these cannot replace the formal structures, they can help where formal structures are weak or missing to a given extent.

Territorial Cohesion and the peri-urban agenda

The European Union, without being directly responsible, nonetheless has a role to play in the shaping of future European territorial development, with special regard to the peri-urban agenda. This is a multilevel agenda which demands cooperation between the EU, national, regional and local levels.
At the EU level, the theme of 'Territorial Cohesion' (TC) focuses on the spatial implications of the Lisbon Agenda *"to assist in improving the governance of cohesion policy, making it more flexible, more capable of adapting to the most appropriate territorial scale, more responsive to local preferences and needs, and better coordinated with other policies, with the principle of subsidiarity"* (CEC 2008). The TC themes and objectives are very relevant to the peri-urban agenda:

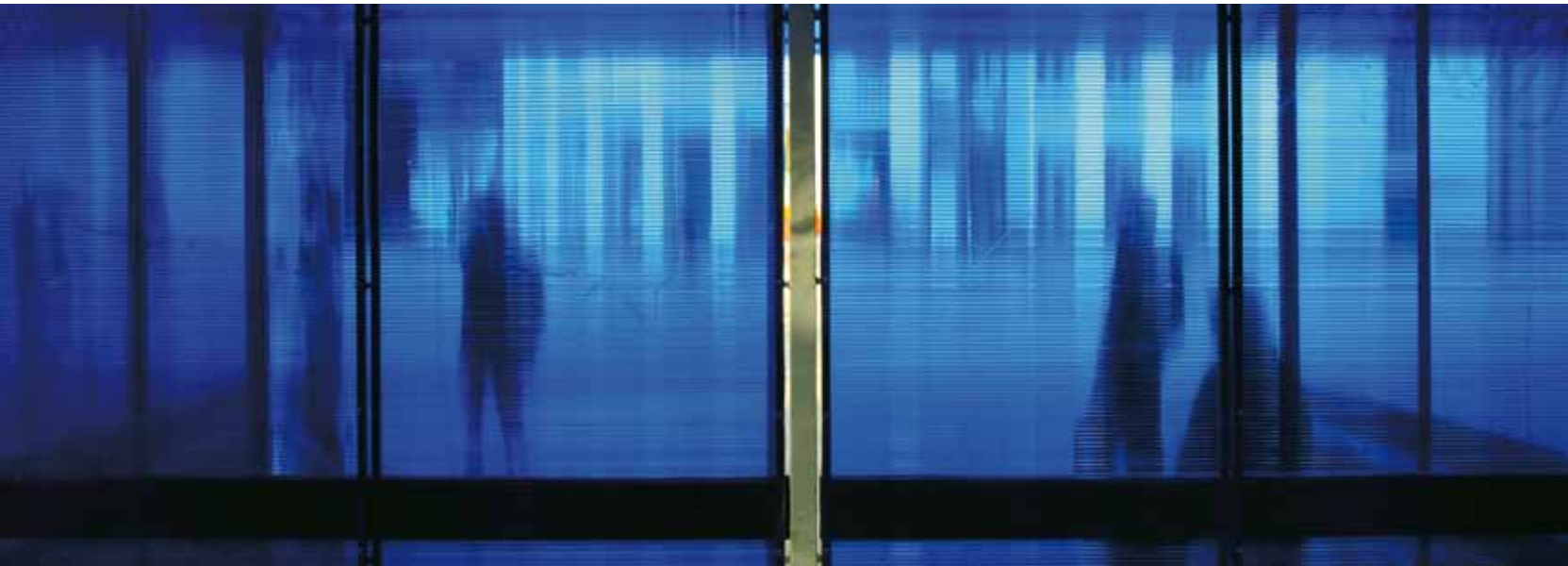
- **Cooperation between territories** involves cross border coordination and strategic policy at multiple scales. This works with the peri-urban as an interface between urban/rural areas, or between different urban and regional systems. Policy also needs to look at the peri-urban as an area type in its own right, with its particular needs and opportunities;
- **Territorial programming** uses the territory rather than the sector as the base for policies and programmes. Functional rural-urban regions need to be considered as integrated systems. Until now, it has often been the case that the peri-urban territory has not been the object of policy discussions;
- **Coordination of policies with territorial impact**. This is very relevant to the peri-urban, which is often an area of conflict or competition between different policy regimes – particularly the urban and rural. The obvious example is regional development funding, which helps to produce urban sprawl in the peri-urban area;
- **Evidence based policy**. Here it is clear that traditional forms of evidence in urban or rural 'units of analysis' may not reflect the reality of peri-urban spaces within functional rural- urban regions. There is a need for new forms of research and evidence based on the new spaces of the peri-urban (of which the PLUREL project is one contribution).

Alternative policy options

On the basis of PLUREL results, it is clear that the EU faces a new challenge in playing a role initiating better public steering of peri-urban development processes. Otherwise, the economic development and growth-oriented policies will lead to unacceptable urban sprawl mainly in the peri-urban areas. This challenge can be approached through different types of EU policy frameworks aimed at more integrated development at the rural-urban region level. Five main options can be drafted for such a policy framework for the post-2013 period:

- **Option (a) – EU Integrated Development Framework Directive**
- **Option (b) – EU Integrated Development Conditionality**
- **Option (c) – EU Integrated Development Community Initiative**
- **Option (d) – Open Method of Coordination for Integrated Development in Functional Regions**
- **Option (e) – EU Reference Framework for Integrated Development in Functional Regions**

Each of these options, which are ranked from the strongest down to the weakest, have benefits and disadvantages, and can be summarised as follows.



Option (a): EU Integrated Development Framework Directive

The 'Integrated Development Framework Directive' would aim at setting the agenda and the standard for integrated territorial development policy. It would strive to provide a legal basis for regulatory reform including guidance for regional funding and infrastructure development at several levels, and a framework for negotiation and assessment that is built into the policy process.

Similar existing tools are mainly in the environmental sector, e.g. the Environmental Assessment Directive and Water Framework Directive. Both of these initiatives are world-leading demonstrations of integrated and proactive policy and regulation. From the history of these directives, it could be learnt that (a) they can be complex and lengthy to transpose to the national level, (b) new tools and methods are needed together with definitions, boundaries, practices and professional skills etc.

It must be emphasised that such an Integrated Development Framework Directive does not have to define exactly, and with pan-European relevance, the content of the required sustainable and integrated development policy. Rather, it can concentrate on procedural questions.

- Pre-assumptions for this option: member states accept the extension of Commission competences.
- Similar tools already existing: Environmental Assessment Directive, Water Framework Directive.
- Advantages of this option: the scope is not only focused on European financing, but other forms of development in general.
- Potential barriers or risks: the process (steps) to reach the broad aims of European rural-urban development has to be precisely defined in legal terms with overall relevance to all member states.

Option (b): EU Integrated Development Conditionality

To access European funding, integrated development plans would have to be prepared on the functional rural-urban region level and be approved by relevant political bodies. This proposal is already under discussion as a possible 'mandatory territorial dimension' in National Strategic Reference Frameworks and their Operational Programmes for the 2014 – 2020 period.

- Pre-assumptions for this option: member states accept the extension of EU competences over EU funding, and functional rural-urban regions are accepted as a practical basis for planning.
- Similar tools already existing: all other conditions placed on Structural Funds to be used (e.g. equal opportunities and gender criteria).
- Advantages of this option: it would be a powerful tool given to the Commission to promote integrated territorial planning.
- Potential barriers or risks: the main criteria (not the precise borders) for functional regions have to be given with pan-European relevance. Integrated development planning has to be phrased very precisely, and the monitoring of the fulfillment of the conditions requires capacities in the Commission. Also, this option will have less influence on countries and regions which receive less EU funding, which include most of the Pentagon areas that have the highest pressure on the peri-urban.

Option (c): EU Integrated Development Community Initiative

There are funds allocated among the member states to be targeted directly at specific pilot and demonstration projects for supporting integrated planning and development in rural-urban regions.

- Pre-assumptions for this option: Community Initiatives again become part of the EU policies and the budget.
- Similar tools already existing: the URBAN Community Initiative was a very successful tool until 2006.
- Advantages of this option: there are no subsidiarity problems, no need for direct approval by the member states and relatively little EU money is needed.
- Potential barriers or risks: the results remain constrained as pilot projects, available Community funding is small, and there is little overall effect on the functioning of rural-urban areas.

Option (d): Open Method of Coordination (OMC) for Integrated Development

Member states have to prepare National Action Plans for integrated development planning. NAPs have to be published, peer reviews organised and the Commission must prepare a critical evaluation.

- Pre-assumptions for this option: approval by the member states to extend the OMC to integrated development in rural-urban regions.
- Similar tools already existing: the OMC is applied in several sectors where the EU has no direct competences (best known OMC for social inclusion).
- Advantages of this option: the OMC forces the member states to deal with the topic to develop their own mechanisms.
- Potential barriers or risks: critical remarks about national programmes have no direct effect. The Commission – beyond commenting – has no power to influence the systems of the countries. The OMC method in its present form is considered to be highly bureaucratic.

Option (e): EU Reference Framework for Integrated Spatial Development

The Commission prepares – with the help of the member states – a Reference Framework with guidance, tools and reference documentation about integrated planning in rural-urban regions.

- Pre-assumptions for this option: the Commission and some member states take on the work to prepare the Reference Framework.
- Similar tools already existing: Reference Framework for European Sustainable Cities (under approval).
- Advantages of this option: the goals of sustainable European development can be demonstrated, allowing each country to refine the concrete tools by adjusting them to their own circumstances.
- Potential barriers or risks: the Reference Framework has no direct effects, its use is voluntary, and the Commission has no power to control and influence its application in the countries.

The clash between conditionality and the subsidiarity principle

As with all new EU initiatives – also in the case of the above policy options – the subsidiarity question has to be addressed. There are some countries where integrated thinking is already applied (at least in principle). They might argue that there is no need at all for the EU to intervene into government and spatial planning issues with the goal of requiring integrated planning. In many other countries however, integrated thinking is still lacking and sectoral, mainly economic development-oriented policies dominate the agenda. The uncoordinated sectoral policies create many externalities and contradictions, affecting the living conditions, the sustainability of development and the level of social inclusion on the local level. In a unified Europe, with the free movement of people and labour becoming full reality from May 2011 onward, this will create large migration patterns towards those (richer) countries which apply integrated policies.

From this argument it follows that in a unified Europe, a certain minimum of integrated territorial planning should be made compulsory either as a directive or as a condition to obtain EU money from any of the available funds. Integrated cross-sectoral and cross-territorial planning on the rural-urban region level has to be applied everywhere.

Without the compulsory requirement of integrated territorial planning, the countries that will suffer the most will be those that already apply this approach, and simply reject the directive or conditionality due to the subsidiarity principle. In the long term, it is in the common interest of all countries in the EU to make integrated planning a compulsory requirement.

EU policy at a time of public deficit

Following the economic crisis and recession, there may be some years of public sector financial deficit and a shift from public sector towards private sector investment. It is therefore relevant that integrated spatial development of the peri-urban be very important to the private sector from both the business and financial perspective. The inclusion of the private sector is:

A) a top-down agenda. EU policies should aim to secure the asset values and investments of major institutions that are often in public-private ownership combinations, e.g. municipal funds, infrastructure firms, pension funds, large landowners and large investors etc. These are the organisations which can take a longer term view rather than a quick profit from uncoordinated development;

B) a bottom-up agenda. Individual firms, developers, entrepreneurs and landowners need to look beyond short-term gains from property sales and development towards more long term asset value.

EU intervention in content or process?

The strong concept of subsidiarity prevents the EU from precisely defining either the delimitation of the rural-urban regions or the content of integrated development. Furthermore, the topic of sustainable and inclusive development is a contested political issue, for which only multilevel systems of targets can be satisfactory.

Thus the EU can only aim for the assessment of plans prepared for functional rural-urban regions in terms of the Territorial Cohesion agenda above: (1) cross-border cooperation, (2) territorial programming, (3) policy coordination and (4) the evidence base.

In each of these areas, there is some kind of balance between 'content' and 'process'. As found with the Environmental Assessment Directive, it is not always practical to set fixed standards and 'blueprints' for these objectives. Instead, the procedures, techniques, participation and evidence bases should be focused upon.

The five briefly discussed options differ from each other not only in their strength, but also regarding their emphasis on the content or procedural side of the regulation. In table 14 the number of "+" signs indicate the strengths of the given aspect.

Of course, it is easier to require procedural than topical sectoral factors as conditions. Further discussions are necessary to analyse to what extent hard factors, such as local taxation and public subsidies, can be influenced in this way from the supra-local (especially European) level. It is also an open question as to what extent country-specific soft factors, such as relational thinking in the UK and compromise culture in the Netherlands, can play a role in environmentally and socially sustainable urban development.

Table 14: Strengths of different policy options for improved steering of peri-urban development processes

	Target of policies	
Policy options	Content	Procedure
1. Framework Directive	++	+++
2. Conditionality	+++	++
3. Community Initiative	++	+
4. Open Method of Coordination		++
5. Reference Framework	+	+

Conclusion and next steps

Overall, there is an urgent need for the EU to address the territorial problem of development, especially the rapid change and controversial development in peri-urban areas.

Addressing this issue is urgent and necessary, but will certainly not be simple. As with other spatial and territorial policy questions, the EU is not the body with the relevant legislative jurisdiction. Therefore, a range of options regarding policy needs to be explored and tested for various levels of the problem and multiple kinds of governance. In addition, it has emerged that 'soft' informal modes of governance need to work in combination with formal structures and regulations. The peri-urban areas in between urban and rural policy regimes may be especially suitable for this kind of approach.

One way to enable both soft and hard approaches is to build up the evidence base, particularly on the peri-urban as a new form of territory with special problems and opportunities.

We hope that the PLUREL project has made a contribution to this evidence base, which can support further debate on the most beneficial type of policy responses.

PLUREL

ANNEX

PLUREL Models and Tools for Rural-Urban Relationships at EU – 27 scale

Modelling the impacts of urbanisation: The methods behind the process

This chapter briefly explains the scientific modelling procedure applied to generate the maps and diagrams shown in this synthesis report.

Scenario modelling

Data related to artificial surface area, GDP and population density have been used as the indicators for urban growth or shrinkage, and were taken as the starting point of the modelling chain (Figure A1). The data source for artificial surfaces is the Corine Land Cover data (CLC2000 (EEA 2010)) on different land use and urban fabric classes, while data on GDP as the economic indicator and population density are derived from EUROSTAT. Time-series analyses of these data provide evidence on the trends of urbanisation from the commencement year of 2000. Four scenarios of future trends have been defined (see page 37). Accordingly, expected changes in demography, migration, oil price development and world demand for various commodities referenced to EU policy assumptions have been entered into specific models for demographic change projections (Scherbov and Mamolo, 2007) and into the macro-econometric NEMESIS model on economic change (Zagamé et al., 2002; Boitier et al., 2008). Simulations were run for the development of 32 production sectors and 27 consumption goods for each country of the EU-27. They result in projections on changes in the key variables for urbanisation: an increase or growth of artificial surface, GDP and population density for the years 2015 and 2025. The projections have been downscaled, and take the specific situation of each NUTSX region into consideration.

Downscaling

The downscaling procedure was carried out with the RUG (Rural-Urban Growth) model. This is a cellular automata model that distributes land use changes driven by urbanisation. It considers the sensitivity of regions to climate change – for example, by defining particular spatial allocation rules for areas at risk of flooding. The allocation approach considers planning preferences (e.g. housing concentration and avoidance of flooding risk zones) and household preferences (e.g. accessibility of cities and distance to the coast), whereas an index for the accessibility of cities takes into account both the probability of commuting to the city of that size, and the travel time-cost along the transport network (Rickebusch and Rounsevell, 2009).

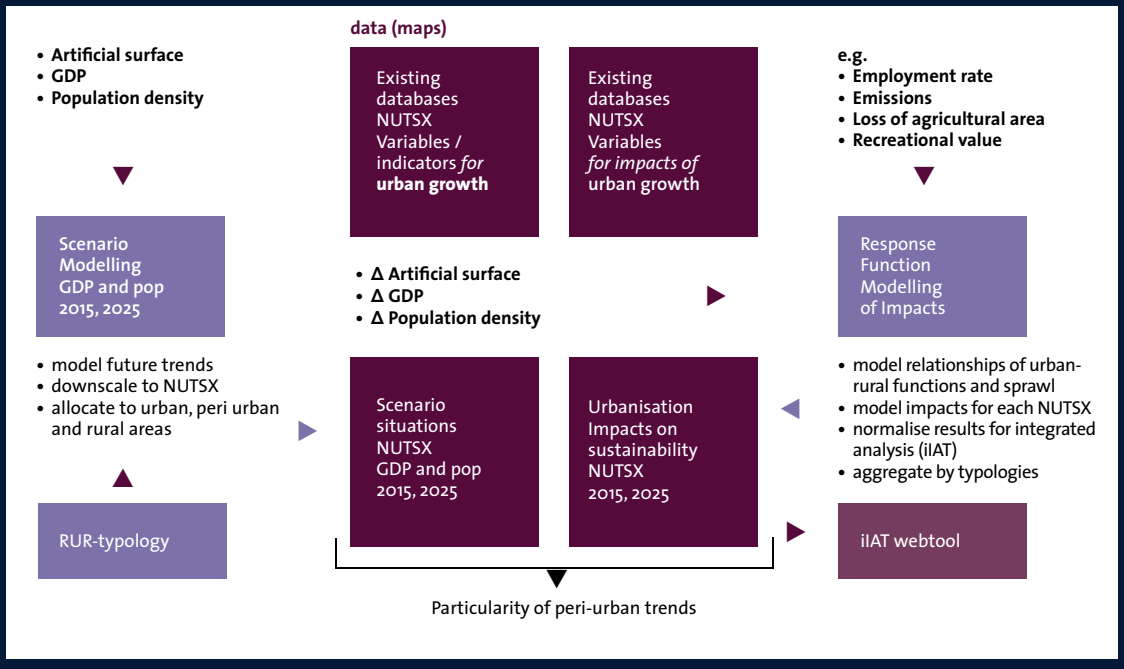


Figure A1: Modelling impacts of urbanisation

PLUREL methodological approach for EU-27 at NUTSX scale

Sub-regional delineation

In the next step, the RUR (Rural-Urban Regions) typology was used for the spatial allocation into predominantly urban, peri-urban and rural regions (Loibl and Köstl, 2009; Zasada et al., 2011).

Sustainability analysis

For the analysis of impacts of urbanisation trends, the EUI (European Urbanisation Impacts) model has been developed within PLUREL. It comprises a series of "response function models" developed by different researcher teams, and follows a similar methodology as follows: It analyses the impacts of urbanisation trends starting with the analysis of data from European databases for each NUTSX region, and uses variables like employment rate, emissions, loss of agricultural area or recreational value. By regression analysis and similar statistical methods, EUROSTAT data series have been related to the key trends of urbanisation, either by share of artificial surface and population density, or by GDP, depending on the driver-impact relationship (see figure 35). The regression analysis resulted in "response models" on specific impacts of urbanisation. These models enable the assessment of the impact in future scenario situations for each NUTSX region, as the change of the endogenous variable (artificial surface, population density or GDP) for each respective NUTSX region is known from the other part of the modelling chain.

Result retrieval and presentation

The final point of the modelling chain is the visualisation and result extraction tool iIAT-EU (integrated Impact Analysis Tool). After a normalisation procedure, all baseline and scenario-modelling results from the EUI model are transferred into the iIAT database. The iIAT-EU is freely accessible on the internet via the PLUREL XPlorer, and allows for result retrieval in the form of spidergrams and maps at various scales, according to user demands.

The PLUREL Xplorer

An information platform for rural-urban land use relationships

How might climate change affect land uses in the urban-rural interface? What might be the future pressures of peri-urbanisation? How might people value agricultural farming in the rural hinterland? Will there be enough water for growing urban agglomerations? What about biodiversity and ecosystem services? Are there example cases for sustainable peri-urbanisation?

Online information platform about peri-urbanisation

A useful platform addressing these and other foresight questions is the PLUREL Xplorer, a web-based online information platform. The PLUREL Xplorer condensates and configures the knowledge and products of PLUREL to support planning and policy discussions on rural-urban land use interactions at European and regional level. It provides information for planners, practitioners and professionals on processes, problems and places of peri-urbanisation in Europe and its regions (Figure A2).

Features of the PLUREL XPlorer

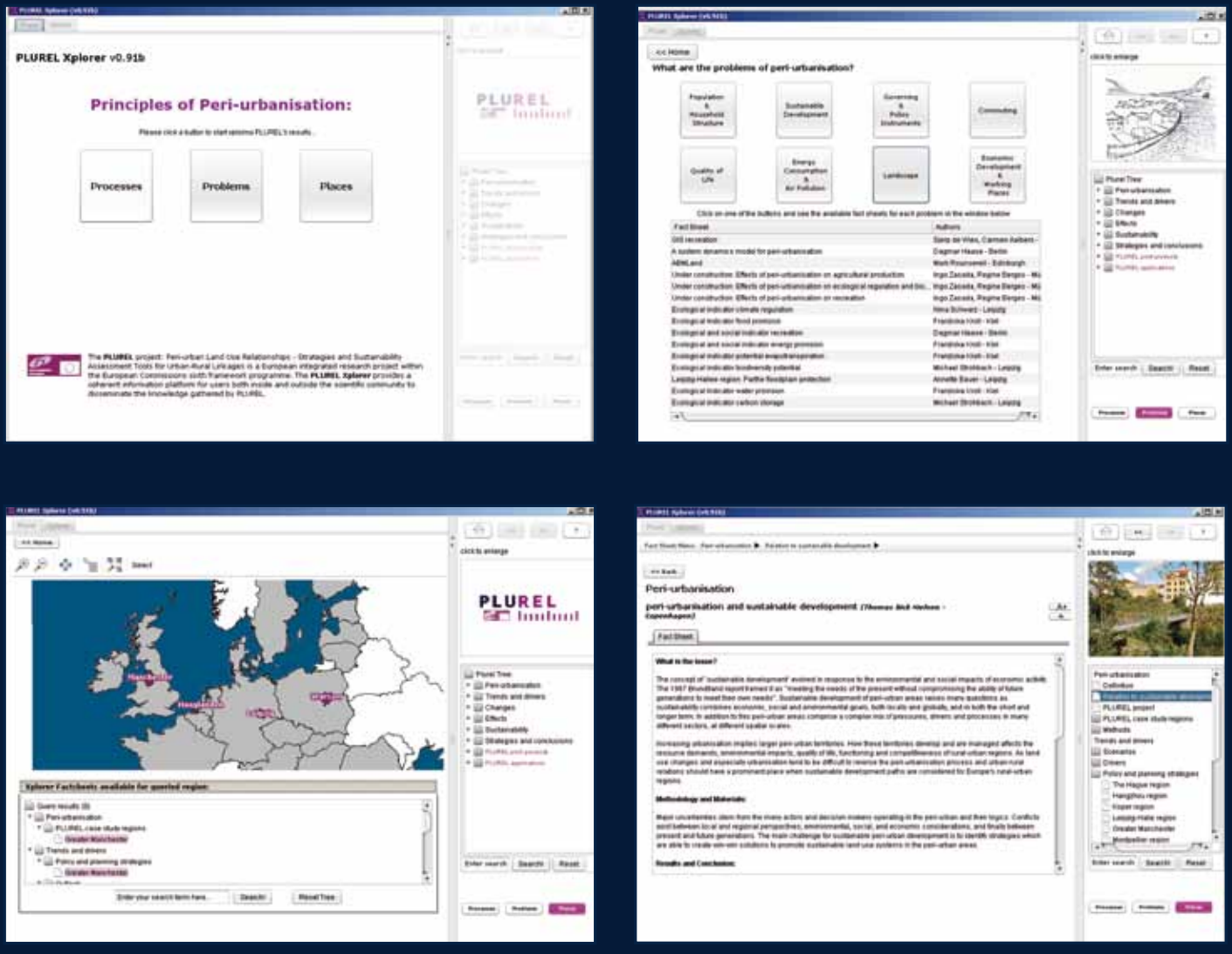
The PLUREL Xplorer front door (user entry) features a modular design similar to the *apps* system. Here, short and illustrated fact sheets guide the user through the knowledge bits and allow for the immediate download of sophisticated background information in the form of reports, figures, maps or sketches. Interactive design elements support the intuitive comprehension of causal interrelations between the knowledge bits. The user entry offers three different perspectives on peri-urbanisation. *Principles and Processes* is the holistic approach comprising all products, interlinked in an analytical chain. The *Problems* category is the thematic perspective, while *Places* displays spatially explicit results of PLUREL from the European down to the case study level (Figure A3).

The back door (supplier entry) is constructed in the form of a web-based fact sheet and file upload system that collects content and meta-information of knowledge produced in PLUREL in a consistent and standardised form. This standardisation also allows for the extension to other knowledge sources of rural-urban interactions in Europe, its sub-regions or abroad.

Access to the PLUREL XPlorer

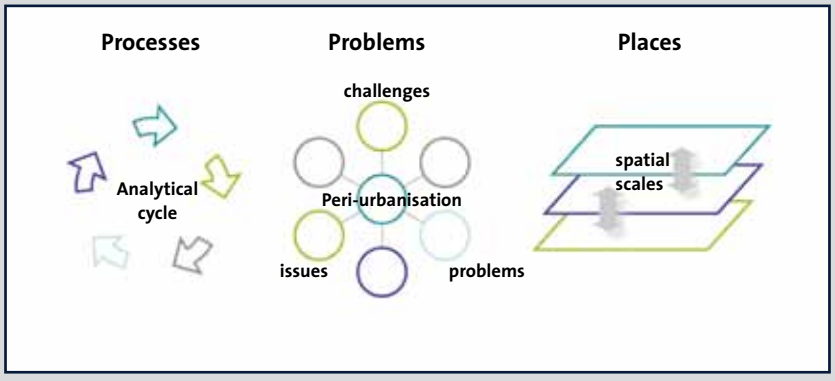
Visit the Xplorer at **http://plurel.ait.ac.at/plurel/xplorer** and explore processes, patterns and places of peri-urbanisation! No software installation is necessary.

Figure A2: The information platform PLUREL XPlorer



Source: ZALF, AIT

Figure A3: Organisation of the PLUREL XPlorer

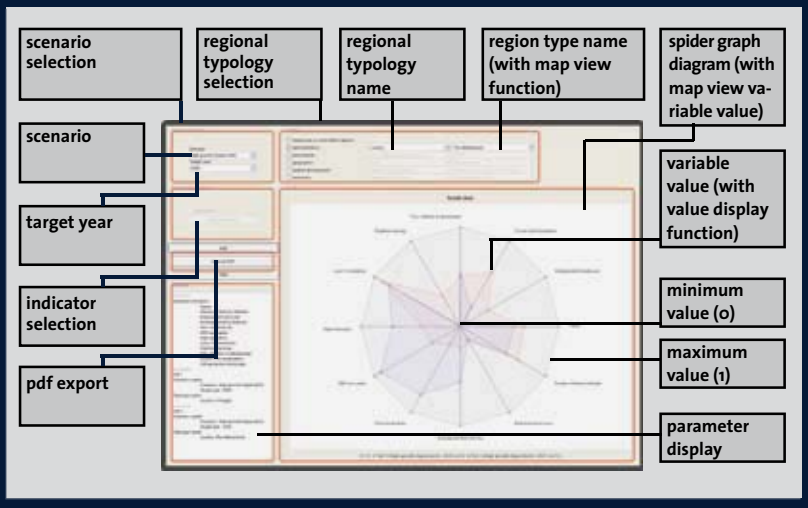


The European integrated Impact Analysis Tool (iIAT-EU)

This chapter introduces the new freely accessible web tool to assess impacts of urbanisation in Europe on the sustainability of regions – the integrated Impact Analysis Tool (iIAT-EU). It is an easily accessible and applicable tool for decision support in the context of spatial development politics and planning.

The PLUREL *integrated Impact Analysis Tool (iIAT-EU)* synthesises the results from the PLUREL modelling of urbanisation and its impacts on various functions into a multipurpose and interactive web tool, the iIAT-EU and the iIAT-region (Piorr et al. 2010; Haase et al. 2010). The iIAT EU has been developed to make comprehensive and complex scientific modelling accessible and understandable for a broad range of end-users, such as regional planners, European policy-makers and stakeholders of all kinds. Users can extract thematically and spatially targeted information for different scales and for different types of regions, and can carry out comparisons which are depicted in spidergrams and can be downloaded as pdf files. Selection between sustainability indicators, scenarios and different spatial units at different scales is the main application principle (Figure A 4) (Piorr et al., 2011).

Figure A4: Functionality and graphical user interface of the PLUREL iIAT-EU



Source: ZALF, AIT, PAS

Selection of indicators, scenarios and spatial units

Users can select a fixed list of sustainability indicators or choose up to 12 indicators out of 28 (Table A1). Integrated result presentation is displayed in spidergrams, while maps can also be produced for individual indicators.

Users can choose the baseline situation based on EUROSTAT time series data or modelled future situations that are affected by urbanisation projections for the four PLUREL scenarios for the time steps 2015 and 2025.

The iIAT-EU covers 543 NUTSX regions of the EU-27. Users can query indicator values for single NUTSX regions, or average values relating to selected groups of regions, or national or EU-27 averages. To allow for thematic comparisons, the iIAT offers eleven typologies. These act as a filter for the generation of grouped average indicator values of regions with similar attributes, for example, rural-urban-region type, spatial-planning type, or the level of natural hazard vulnerability, innovation and accessibility.

Thematic integration

All indicator values for all variables and all regions in all projections have been normalised to make them comparable, so that users can compare intensity and dynamics of response to urbanisation, even if they address different spatial units in their comparisons. Each European region has a specific profile that determines its response to global drivers, urbanisation trends, related land use changes and the impacts of these. Therefore, it is important not only to allow a broad view over various sustainability indicators, but also to permit a better insight into the combined trends and their effects that differ, depending on which spatial scale is considered. A tool-tip function supports users in their selection procedure. It provides a map visualisation of the value distribution of indicators and typologies across the EU-27 (see figure A5). By applying the three selection steps, users can conduct an integrated analysis. Up to three analyses can be compared and visualised in one output presentation as spidergrams.

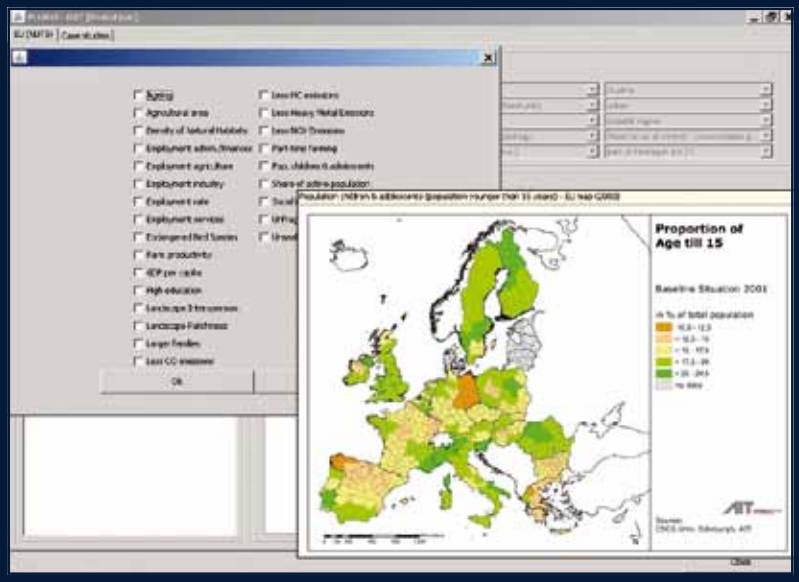
A novel interface between science and policy-making

The application principles, the functionality and the graphical user interface of the iIAT-EU have been developed in close collaboration with planners, administration, policy makers and stakeholders. Combining thematic broadness of projections with spatial flexibility is the new quality of the iIAT-EU, thereby facilitating knowledge integration for discussions and decision making towards sustainable solutions for urban-rural relationships.

Access to the PLUREL iIAT-EU

Visit the PLUREL iIAT-EU at **http://plurel.ait.ac.at/plurel/iiat**. It is easily accessible without any restrictions and no software installation is necessary. You only require an available internet connection and a JAVA runtime environment (freeware) to be installed on the client computer.

Figure A5: Selection of indicators and map viewer



Source: ZALF, AIT, PAS

Table A1

Indicators of the iIAT-EU
Environmental
Density of Natural Habitats
Endangered Bird Species
Landscape Interspersion
Landscape Patchiness
Landscape Fragmentation
Soil sealing
CO Emissions
HC Emissions
NOx Emissions
Heavy Metal Emissions
Economic
Agricultural Area
Farm Productivity
Part-time farming
Gross Domestic Product per Capita
High Education
Share of Active Population
Social
Aging
Employment Agricultural Sector
Employment Administration/ Finances Sector
Employment Industrial Sector
Employment Service Sector
Employment Total
Large Family
Children and Adolescence
Social Individualisation

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Peri-urbanisation in Europe:
Towards a European Policy to Sustain Urban-Rural Futures
A Synthesis Report

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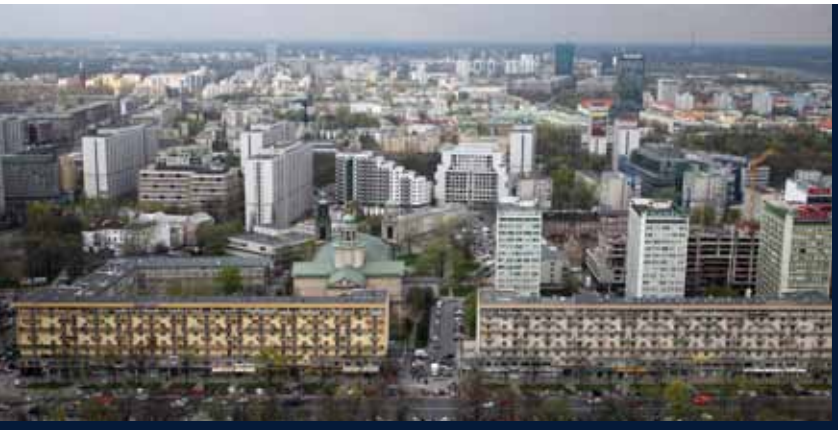

The peri-urban – the space around urban areas which merges into the rural landscape – is growing across Europe. The peri-urban is a zone of innovation, knowledge based and globalized enterprise. It is also the place which attracts new types of housing, transport infrastructure and multifunctional agriculture, with a diverse range of recreation sites and ecosystem services.

Urban development, by far the most rapidly expanding land use type in Europe, puts peri-urban areas under particular pressure: the growth of built development in peri-urban areas is likely to be up to four times as fast as in urban areas. The risk is urban sprawl, with its many societal and environmental problems.

A more balanced and sustainable pattern of development needs a better policy focus, not only on peri-urban areas, but on the wider rural-urban region which surrounds them. A more integrated EU level policy and funding system can enable and encourage integrated development at the local, regional and national levels.

This synthesis report, based on new research from the EU Integrated Project PLUREL, quantifies the trends, risks and opportunities for peri-urban areas, sets out new concepts for urban- rural linkages, and provides recommendations for targeted policies for rural-urban regions across Europe.

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